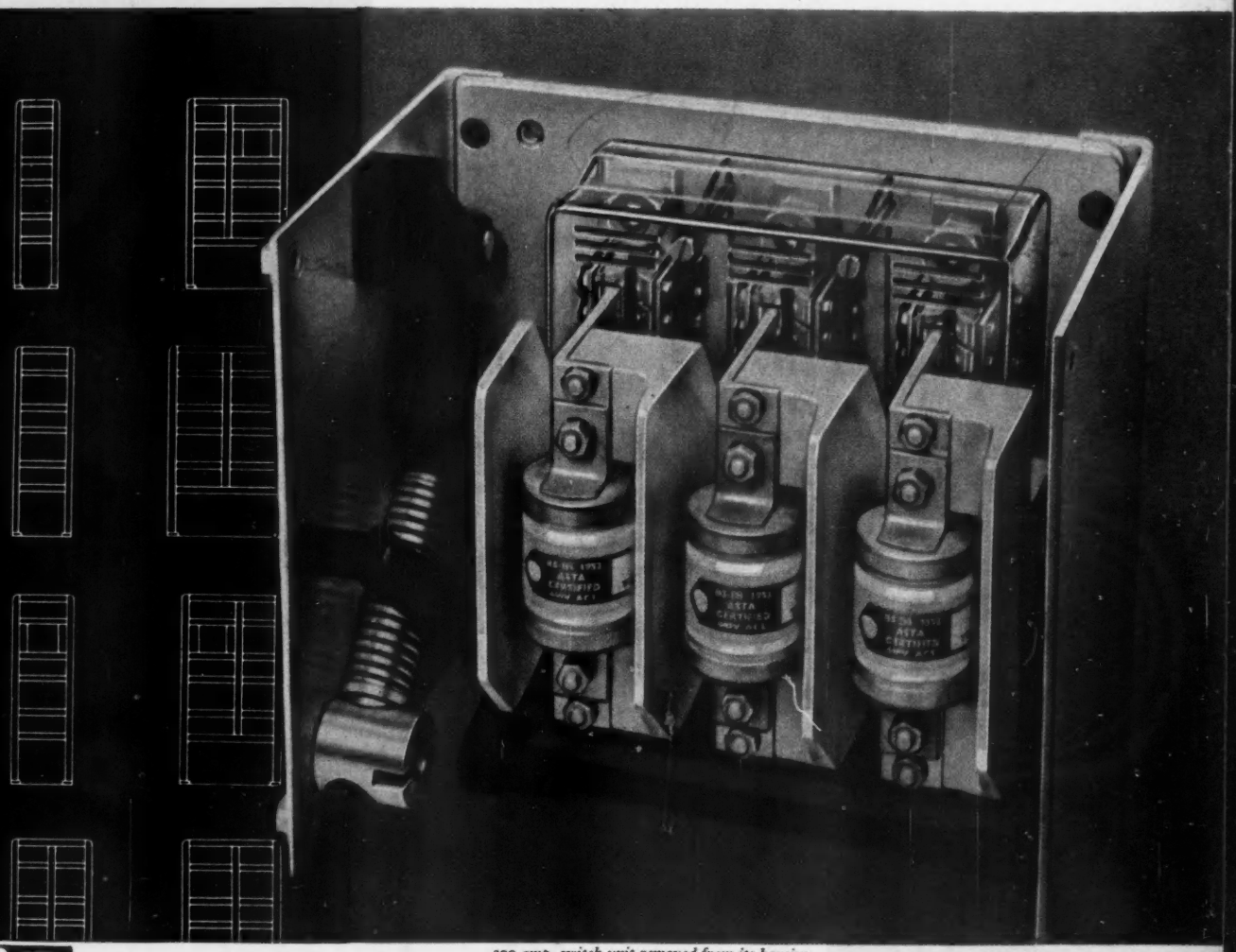
26 OCTOBER 1961

ONE SHILLING
AND SIXPENCE

ELECTRICAL TIMES



300 amp. switch unit removed from its housing.

ELLISON

HEAVY DUTY FUSE-SWITCHGEAR

EXCEEDS THE REQUIREMENTS OF B.S. 3185: 1959

MAKING CAPACITY
46,000 amps, at 550 volts, ·15 power factor.

SWITCH BREAKING CAPACITY
6 to 8 times the rating at ·25/·3 power factor.

BUSBAR COPPERWORK
complies with B.S. 159: 1957.

550 VOLT A.C.

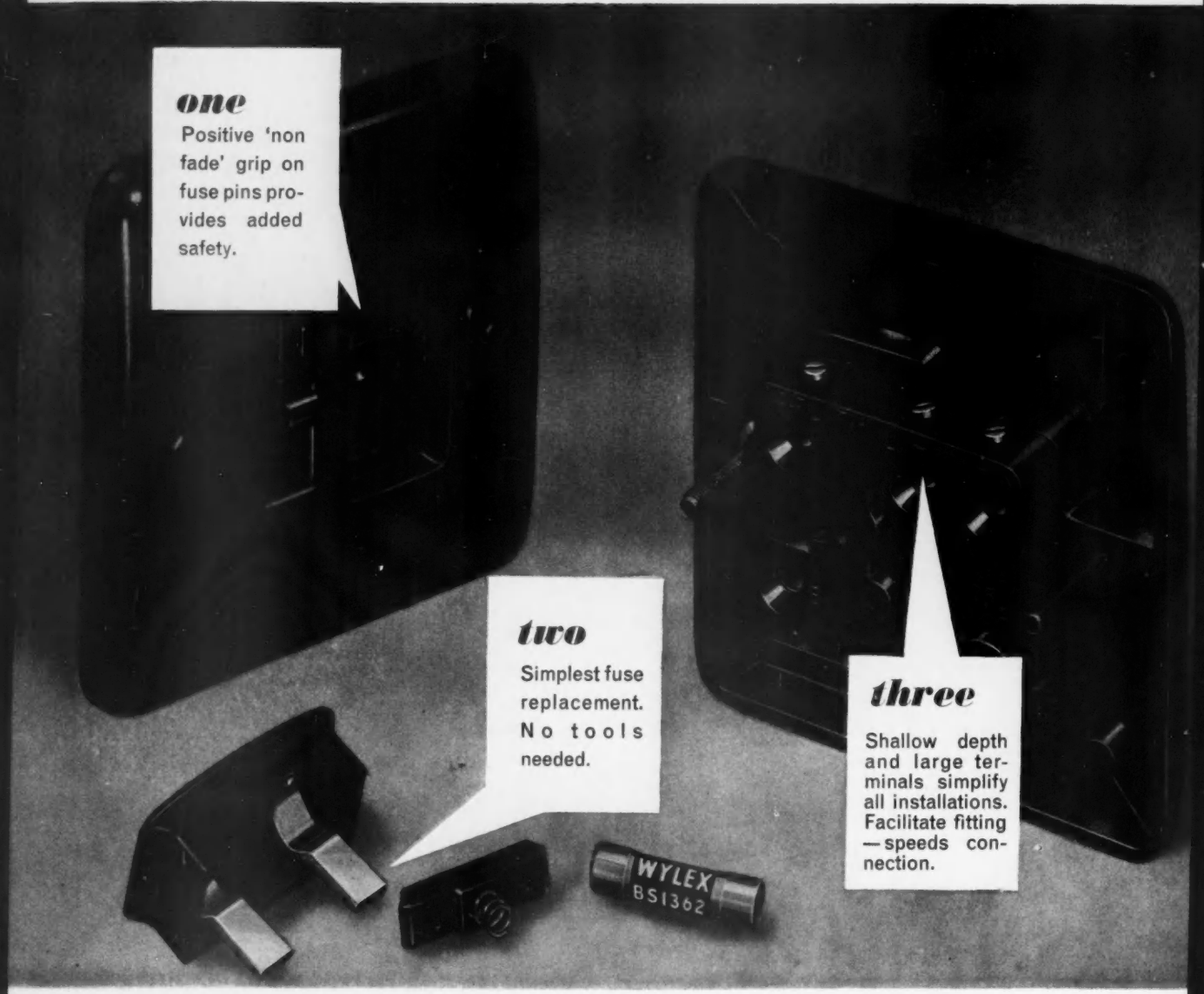
GEORGE ELLISON LIMITED

PERRY BARR · BIRMINGHAM 22B

870

Wylex build quality into SPUR BOXES

in three special ways....



one

Positive 'non fade' grip on fuse pins provides added safety.

two

Simplest fuse replacement. No tools needed.

three

Shallow depth and large terminals simplify all installations. Facilitate fitting — speeds connection.

Switched Spur Boxes by WYLEX offer the extra quality that you would expect — and at no extra cost! Featuring the WYLEX DP/AC switch (13 amp.) — proved by years of extensive service. The right choice when connecting fixed appliances to Ring Main Circuits. Fitted with B.S. 1362 cartridge fuse. Made flush to fit Standard Ring Main Box or Surface All-Insulated. With or without Pilot Light, Brown or Ivory.

Wylex build quality into

COOKER UNITS
SWITCH FUSE
CONTROL UNITS
SWITCHES, SPUR BOXES
PLUGS & SOCKETS

WYLEX

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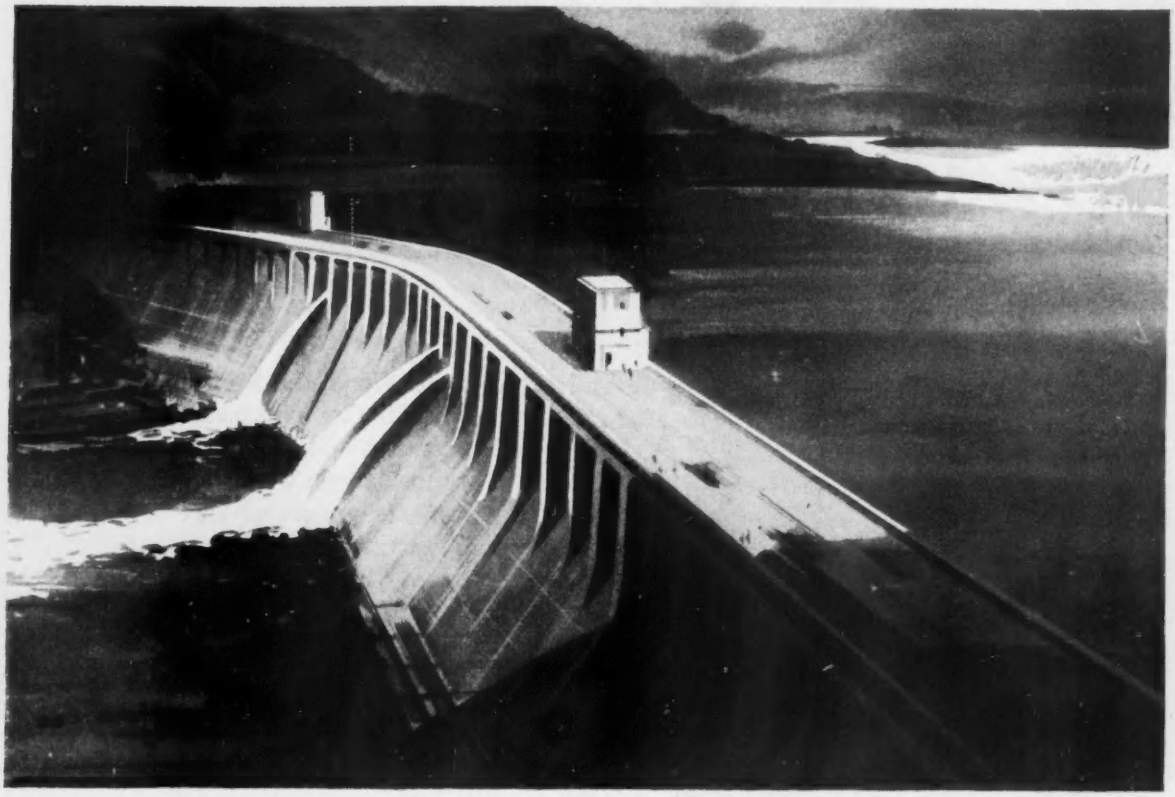
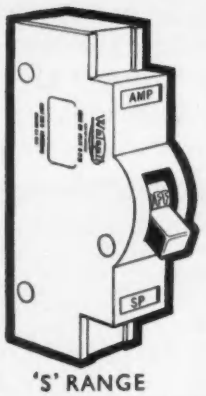
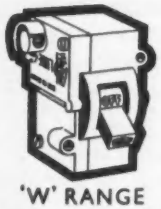
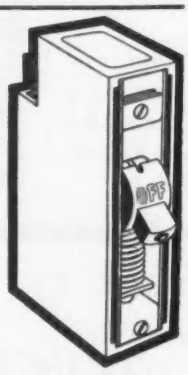




'S' RANGE



'W' RANGE



'A' RANGE

"WAL-BREAK" MINIATURE CIRCUIT BREAKERS

COMPLETE CONTROL

and protection of an electrical circuit is achieved by the use of miniature circuit breakers, ensuring safety in all situations.
Three types are available:

"S" range — 5 to 60 amps.—Single pole to triple pole and neutral ways. Neutral switched or solid.

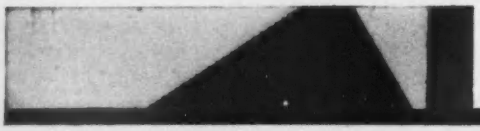
"A" range — 4·5 to 30 amps.—using four ratings each adjustable to circuit conditions.

"W" range — 5 to 15 amps.—an all insulated unit to fit a standard BSS. 1299 box.

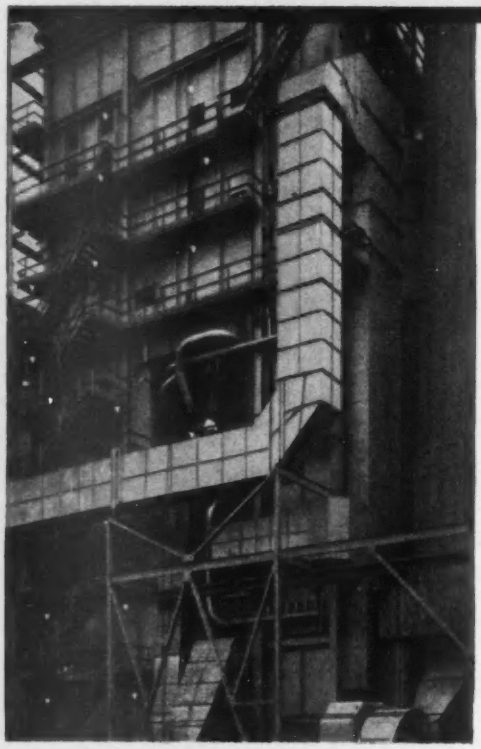
Walsall

WALSALL CONDUITS LTD., EXCELSIOR WORKS, WEST BROMWICH
Telephone: Tipton 1171

A



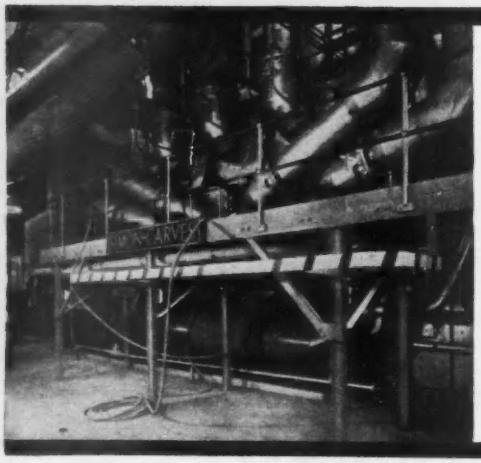
"Remarkable" SAID THE MINISTER



So said Mr. Richard Wood, the Minister of Power, at the inauguration of Britain's first once-through supercritical forced-circulation boiler. Designed and built by Simon-Carves at the Margam works of the Steel Company of Wales, it marks a major advance in large-scale steam generating practice.

The steam conditions of 3300 p.s.i. and 1060°F are the highest yet commercially used in Great Britain. The associated back-pressure turbo-alternator gives an output of 9500 KW (approximately 30% increased on the installed capacity of the existing generation plant). Process steam is exhausted at 650 p.s.i.g. and reheated to 820°F to serve the new turbo-blowers and the existing system.

Whether generating steam at pressures above or below the critical pressure, the O T boiler has many advantages over conventional natural and assisted circulation boilers. These are explained in the brochure 'OT Forced-Circulation Boilers by Simon-Carves Ltd'.



left. The operating front of the boiler is housed in the turbine building. Fuel can be blast furnace gas or fuel oil or a mixture of both.

right. The central control panel. From here, both the boiler and the high pressure turbines are controlled.

O T FORCED-CIRCULATION BOILERS BY

Simon-Carves Ltd

MEMBER COMPANY SIMON ENGINEERING LTD

CHEADLE HEATH, STOCKPORT · *AND AT CALCUTTA · JOHANNESBURG · SYDNEY · TORONTO*

SC 252/PS

The Romans too had a word for it. . .

As a matter of fact, they had three words for it. So have we, but they are not the same. To the Romans, PARVALUX meant "Light But Little". To us, it means Fractional Horse-power Motors—and that is what it means to our numerous customers, organisations whose names are known the world over. And so, of course, the name PARVALUX is known all over the world, too. When we are asked to build a machine, years of skill and craftsmanship go into its construction. That is why intricate specifications never worry us. We also have a very extensive range of standard f.h.p. motors and gear units, with horsepowers varying from 1/300 to 1/5, yet even these can be modified to suit any customer's special requirements. If PARVALUX also meant "versatile", we should not be at all surprised.

Fractional Horse-power Motors by...

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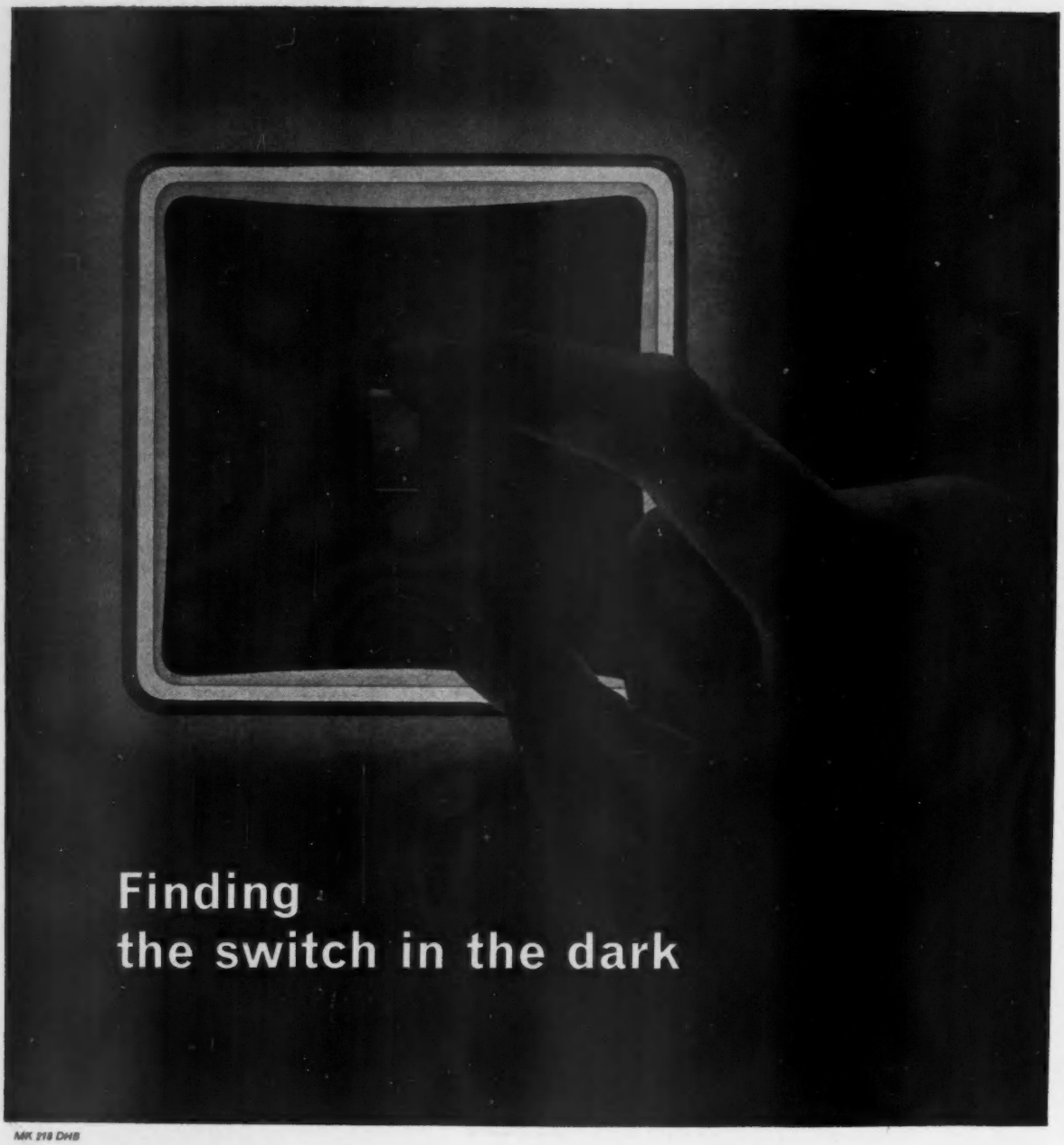

MK 219 DHB

MK

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Groping in the dark to find a switch or socket-outlet frequently results in clashes with furniture and also finger-soiled walls. The solution is to see them, not to 'feel' for them.
The M.K. Luminous Locator is a neat fitment which surrounds any British Standard flush switch or socket-outlet which has two fixing screws on 2¾" centres.
Emits in darkness by a practical application of 'Panelume' electroluminescence a bright glow which completely surrounds the switch or socket-outlet. Reverts in daylight to ivory colour, in harmony with any decor.
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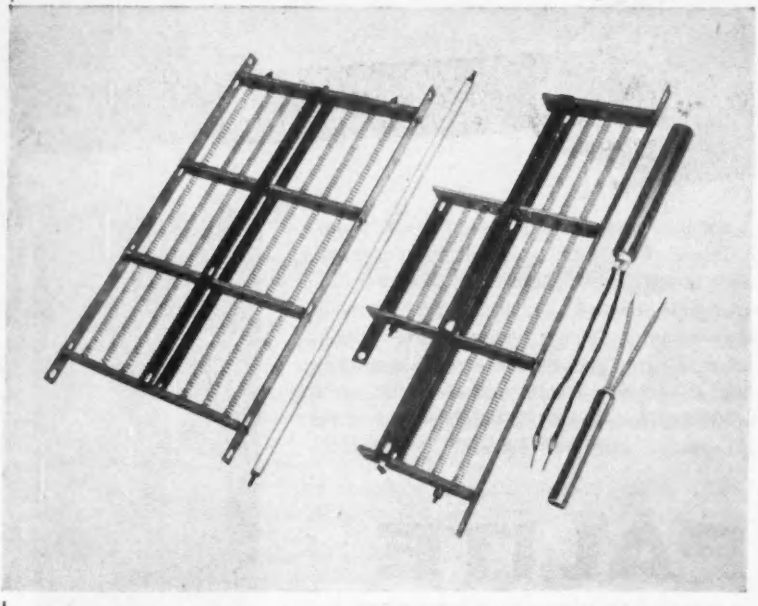

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We invite your enquiries

The cut-away type element illustrated above is as used in the Sofono Spacemaster Convector Heater.

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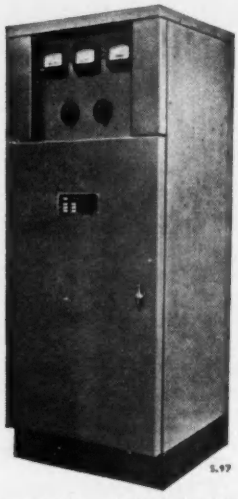
PACKS MORE IN THE SAME SPACE

Keepalite, the Chloride Company's automatic emergency lighting system, is now equipped exclusively with the new Chloride Planté cell which occupies only half the space previously needed by cells of the Planté type of equivalent capacity. Keepalite thus adds this important advantage to the many virtues that have made it the most trusted and widely used emergency lighting system in Great Britain. Despite its small size and light weight, the new cell is extremely robust and has all the great length of life associated with the Planté type of construction. As always, the advisory service of the Company's electrical engineers is at the call of electrical contractors and engineers who are interested in emergency lighting installation.



KEEPALITE

AUTOMATIC EMERGENCY LIGHTING EQUIPMENT

A PRODUCT OF CHLORIDE BATTERIES LIMITED · BACKED BY WORLD-WIDE SERVICE

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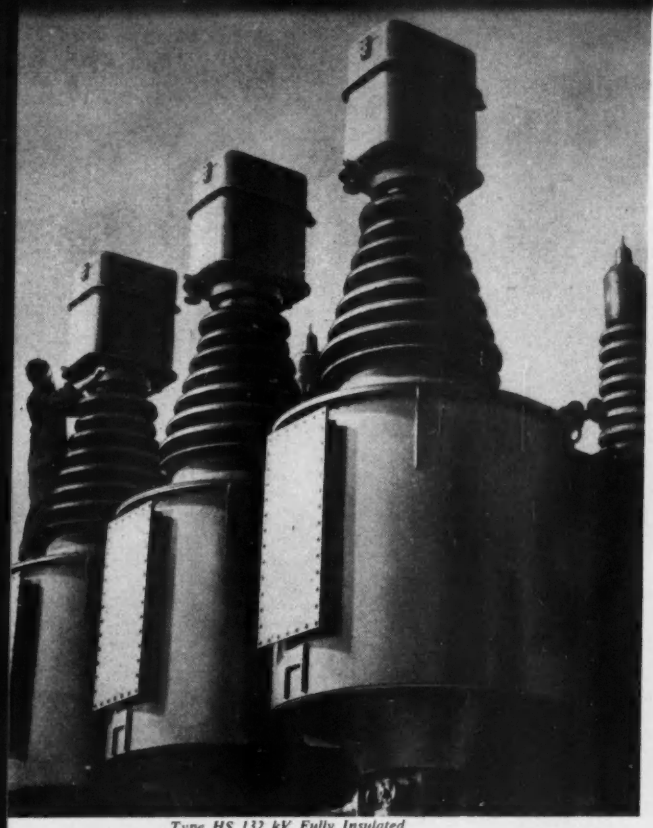
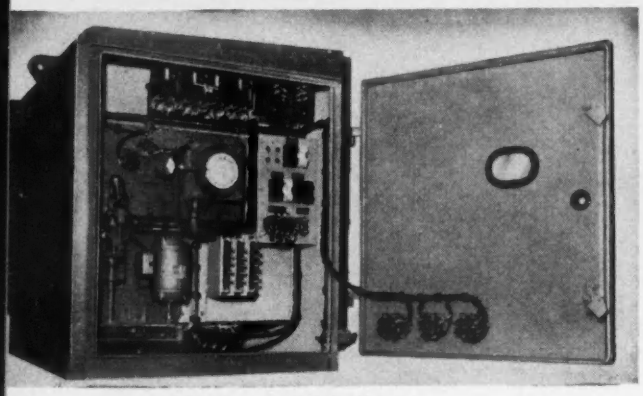
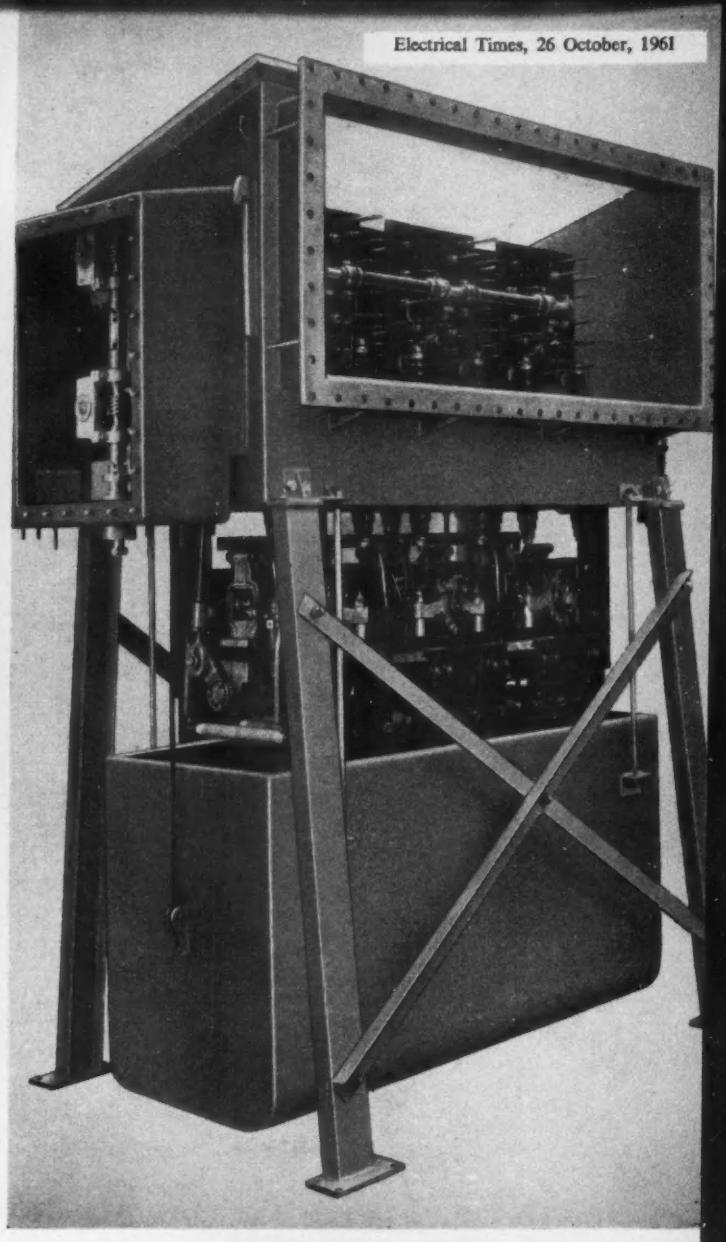


Type HS 132 kV Fully Insulated



Type "F" up to 33 kV, 200 amps



Type HS up to 66 kV, 400 amps

ON-LOAD TAP CHANGERS

As manufacturers of Transformers up to the largest sizes and highest voltages, we are in the forefront in the design and manufacture of high-speed resistor on-load tap changers for a wide range of applications. Designed as self-contained units for direct attachment to the Transformer tank, our equipments are supplied to other Transformer manufacturers both home and overseas.

Our very considerable output of tap changers has enabled us to effect a great measure of standardisation without limiting in any way the extensive range of applications.

CURRENT RATINGS and VOLTAGES

On-load tap changing equipment is available for service voltages:—
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Current ratings: 100 up to 1250 amps.

These ratings cover requirements for power transformers up to the largest ratings and highest service voltages.

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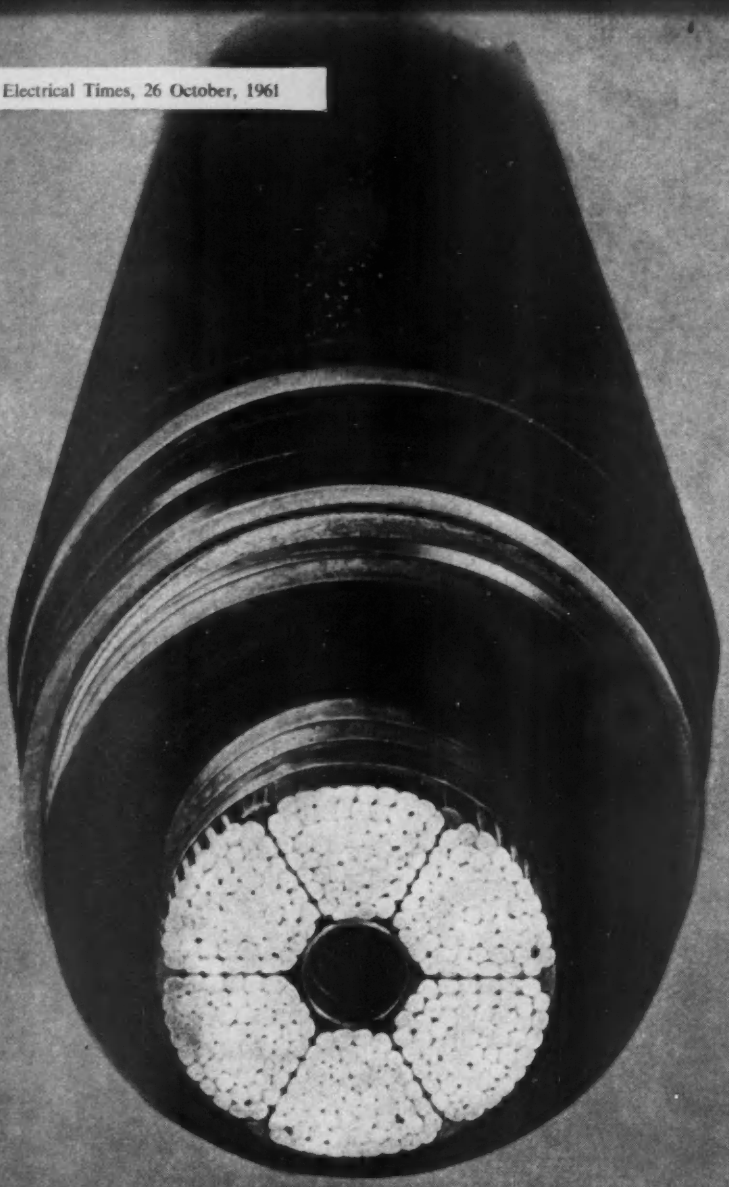
Telephone: LARkswood 2350

Also at Birmingham, Glasgow and Manchester



This cable carries 1700 amps

230 kV BICC power cable for TORONTO

Manufactured to the order of the Hydro Electric Power Commission of Ontario for a new underground power link between Haig Junction and Applewood Junction in Toronto, this cable will provide two 3-phase circuits — each designed for operation at 230kV.

The oil-filled paper-insulated cable has a single 2750 mcm. conductor comprising six stranded segments laid round a central oil duct. It has been installed under the supervision of Phillips Electrical Construction Company Limited, a member of the BICC Group.

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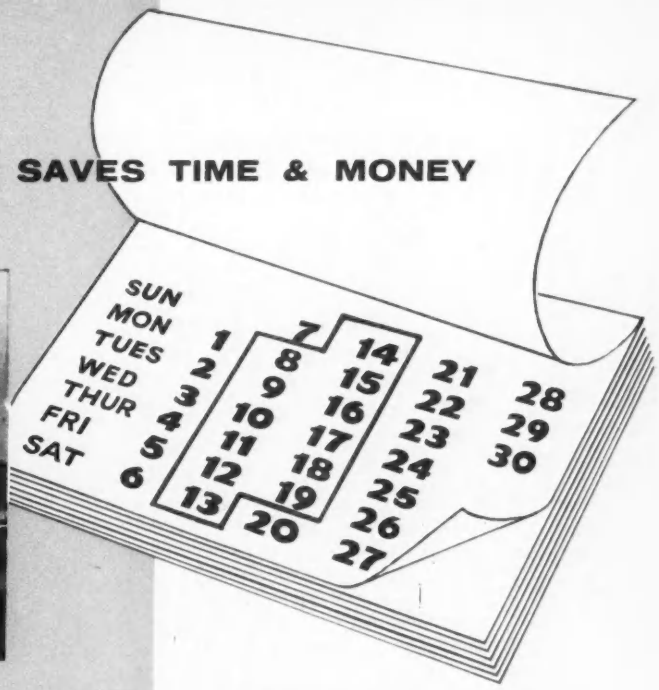
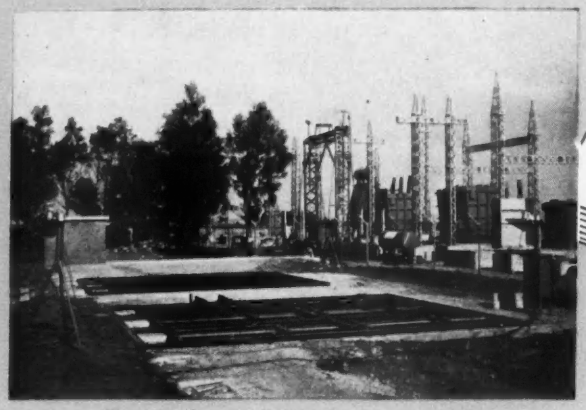
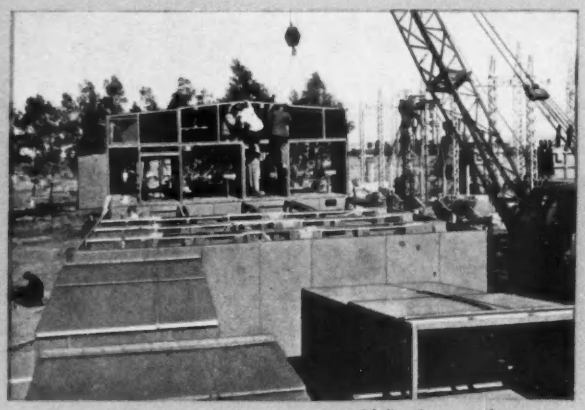
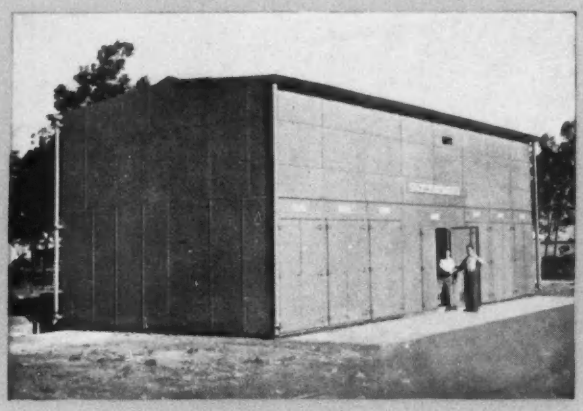




The base frame is laid on the concrete plinth



Assembly of top deck is commenced, following erection of the side frames



Ferralloys Substation, Anglo-Transvaal Ltd., S. Africa — installation complete

IN A MATTER OF DAYS

The speed with which S.W.S. 33kV package switchgear can be installed is phenomenal in the field of extra high voltage switchgear. There are instances of switchboards being completely installed within 12 days. Speed and ease of erection is due to accurate factory planning and the completion of the bulk of drawing office work by S.W.S. draughtsmen prior to delivery to the site. All that is required is a single concrete plinth on which the base frame is set.

Other advantages include:

- ★*Minimum space requirements.*
- ★*Economy in initial and maintenance costs.*
- ★*Suitability for service in any climatic conditions.*
- ★*Ability to fit into existing electrification schemes.*
- ★*'In situ' inspection in all weathers.*
- ★*Air-insulated, either single or duplicate busbar, fully tested and certified and complies in every respect with BS116: 1952.*
- ★*RATINGS: 33kV, up to 1000 MVA and currents up to 2000A.*

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—the only 33kV Package Switch

fully
proven
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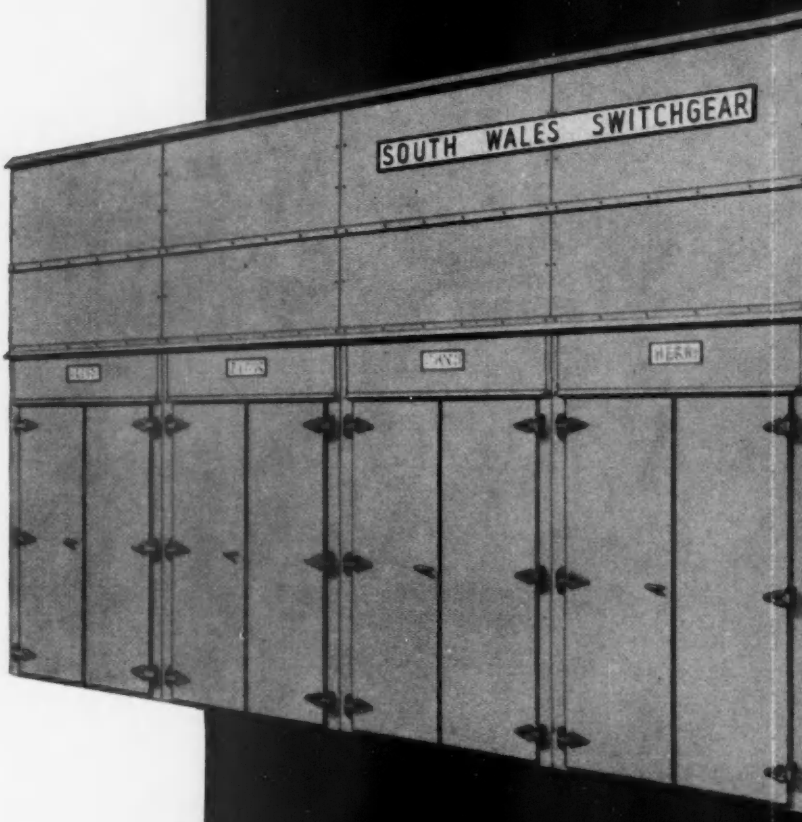
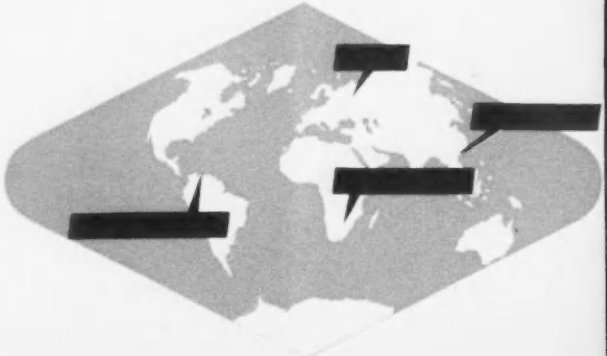
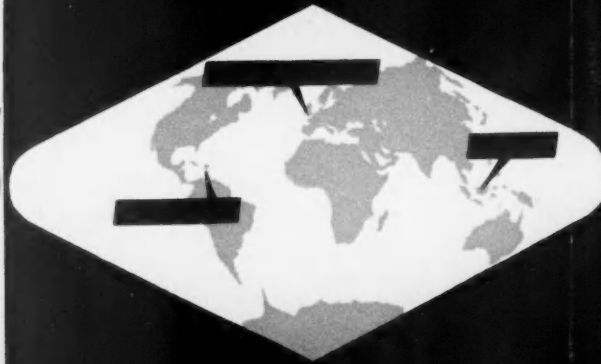






WITCHGEAR

chgear

OVERSEAS

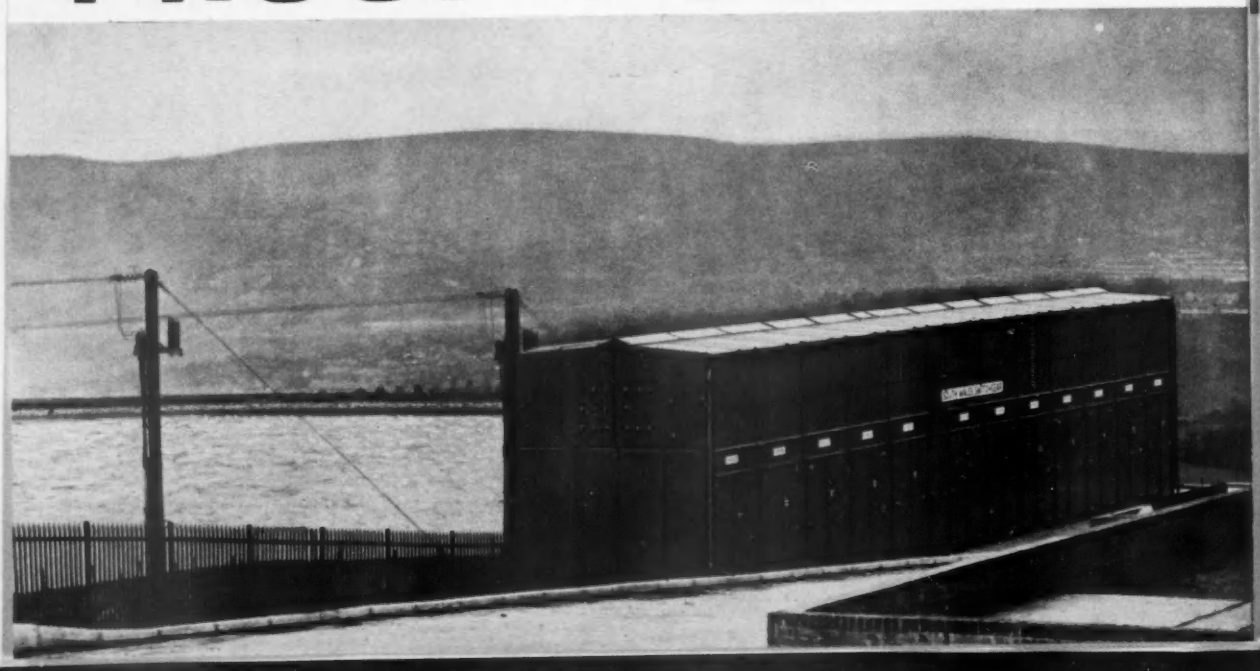
This air-insulated package switchgear unit is the most modern and economic development in 33kV switchgear and has, since its introduction, given reliable and efficient service in many overseas countries.

GREAT BRITAIN

Installations have been made with the E.E.B., E.M.E.B., M.E.B., N.W.E.B., S.E.B., S. WALES E.B., S.E.E.B., S. West E.B., S. of Scotland E.B., and with the Central Electricity Generating Board (S. Wales Div.) and the National Coal Board.

Electrical Times, 26 October, 1961

PROOF POSITIVE



UNISTRUT
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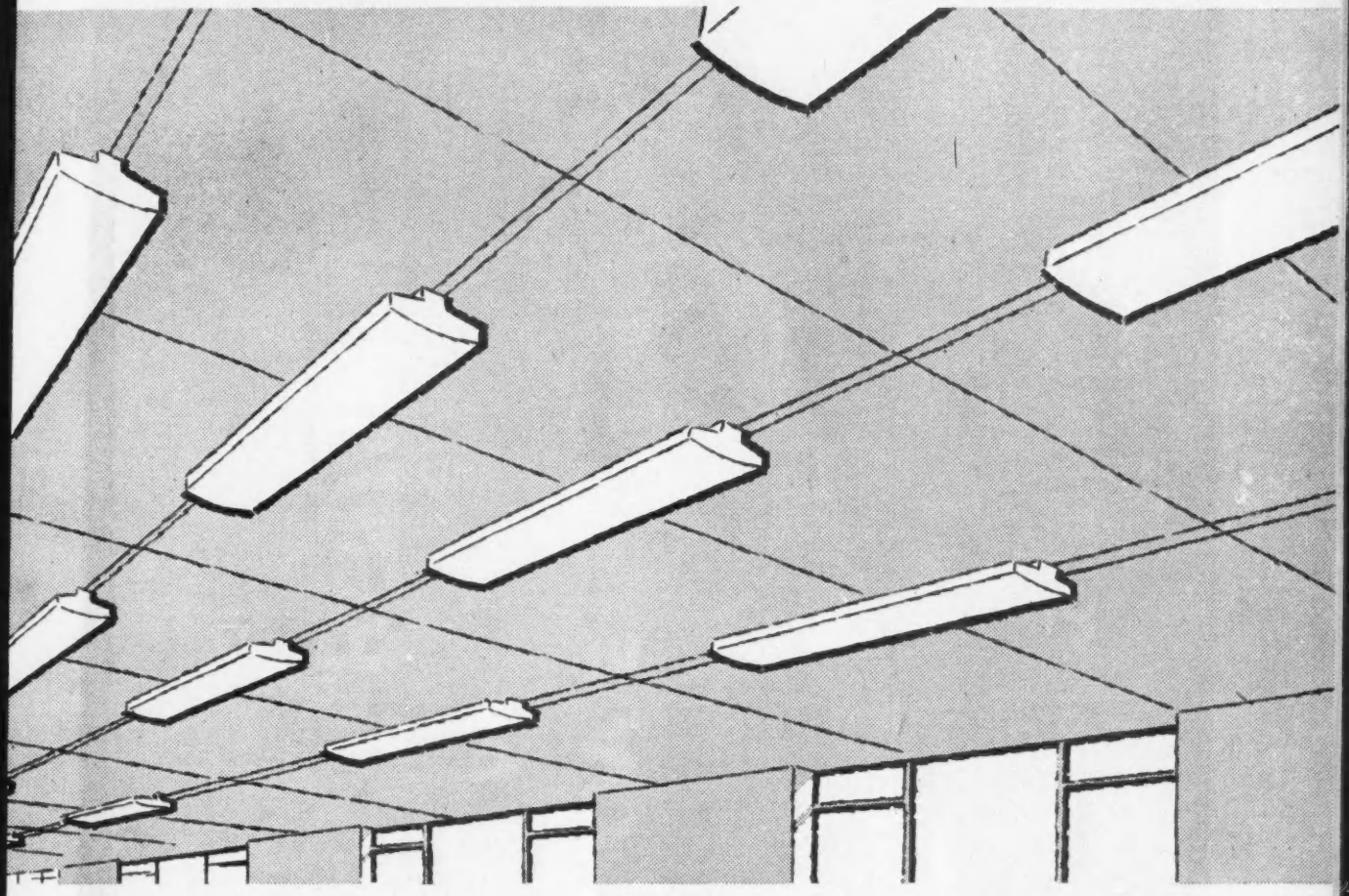
FOR *CHEAPER* AND *NEATER* LIGHTING INSTALLATIONS



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UNISTRUT DIVISION OF SANKEY-SHELDON LIMITED

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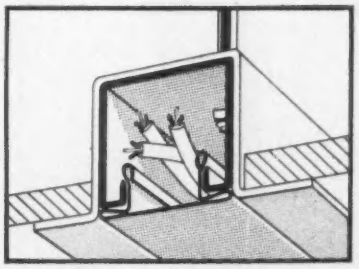

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Where trunking and false ceilings are to be supported, the UNISTRUT 'Top Hat' section is simply placed over the top of the required length of basic UNISTRUT channel. This permits ceiling panels to be closely fitted to each side of the channel, which is itself left open until the wiring installation is completed. Closure is made by standard UNISTRUT closer strip which gives a neat, flush finish.

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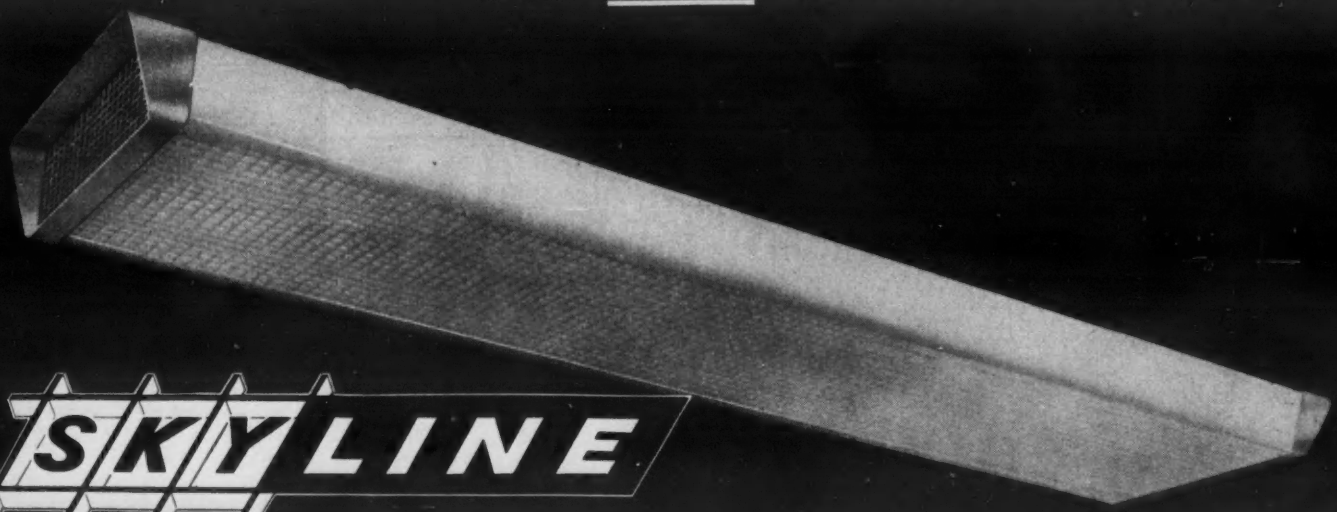

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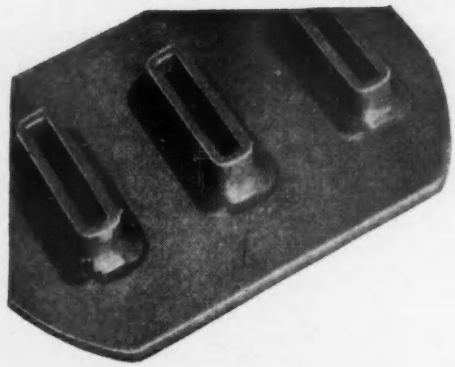

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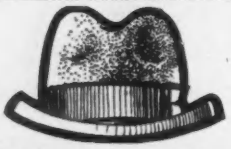
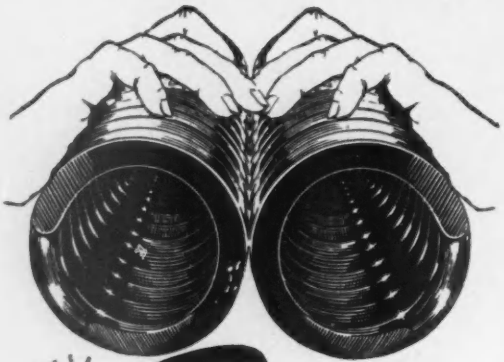


Looking in the right direction



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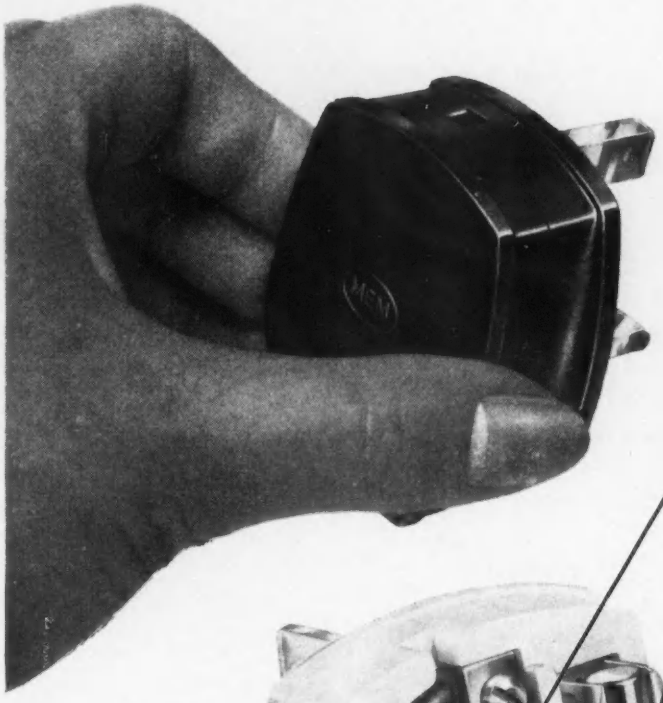
SOUNDLY CONSTRUCTED · EASY TO WIRE · COMPETITIVELY PRICED

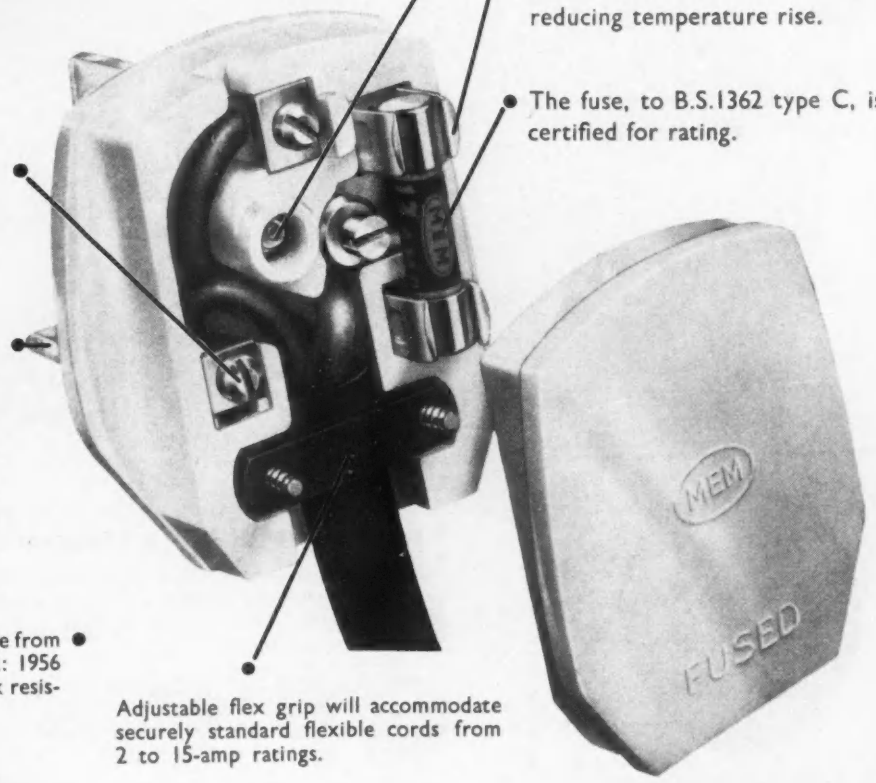


- The plug is shaped to encourage natural handling and facilitate easy entry or withdrawal and the fingershield prevents contact with the live pins.
- Live terminal fixed to base and position allows for wiring without removal of fuse.
- Cover screw is captive.
- Fuse clips are of heavy gauge phosphor bronze heavily silver plated to offer minimum contact resistance, thereby reducing temperature rise.
- The fuse, to B.S.1362 type C, is ASTA certified for rating.

Pinching screws are shaped to prevent cutting the conductors.

Plug pins and terminals are in one piece for strength and are held tightly in the moulded plug base by special resilient inserts. They nevertheless can be raised and lowered by finger pressure for ease of wiring.

All mouldings are made from powders to B.S. 1322: 1956 and possess high track resisting qualities.



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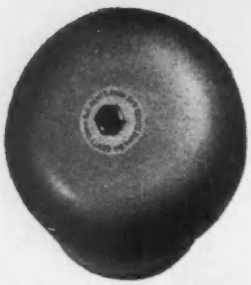

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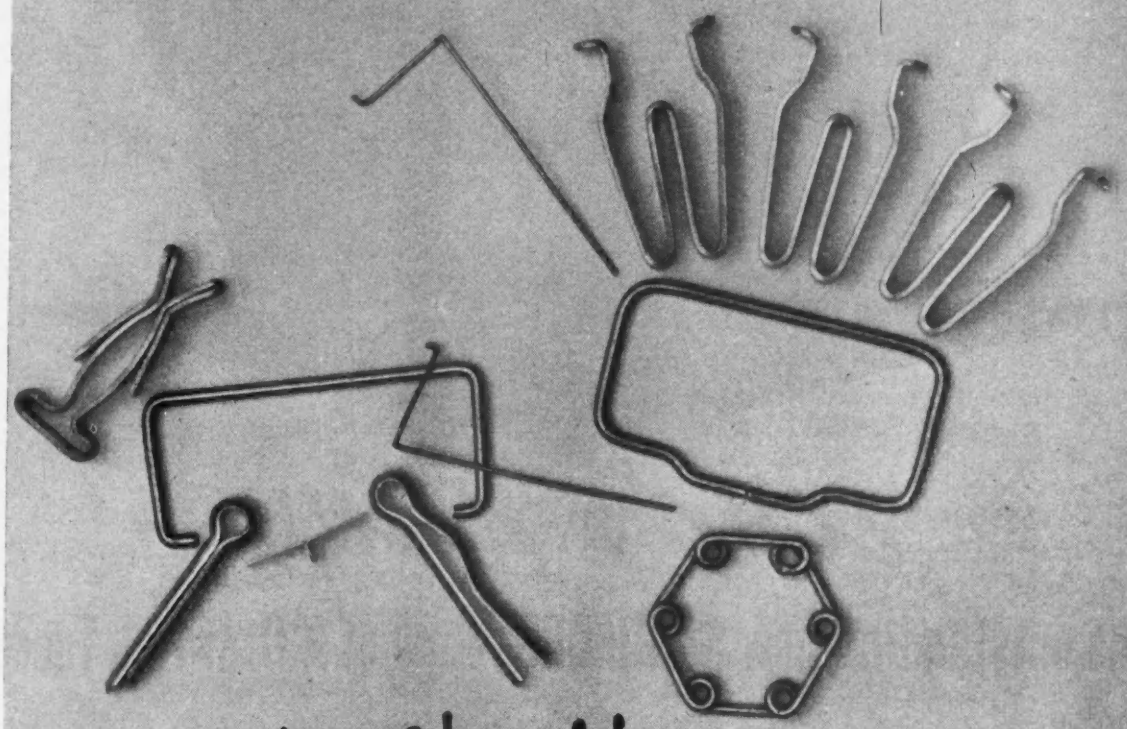

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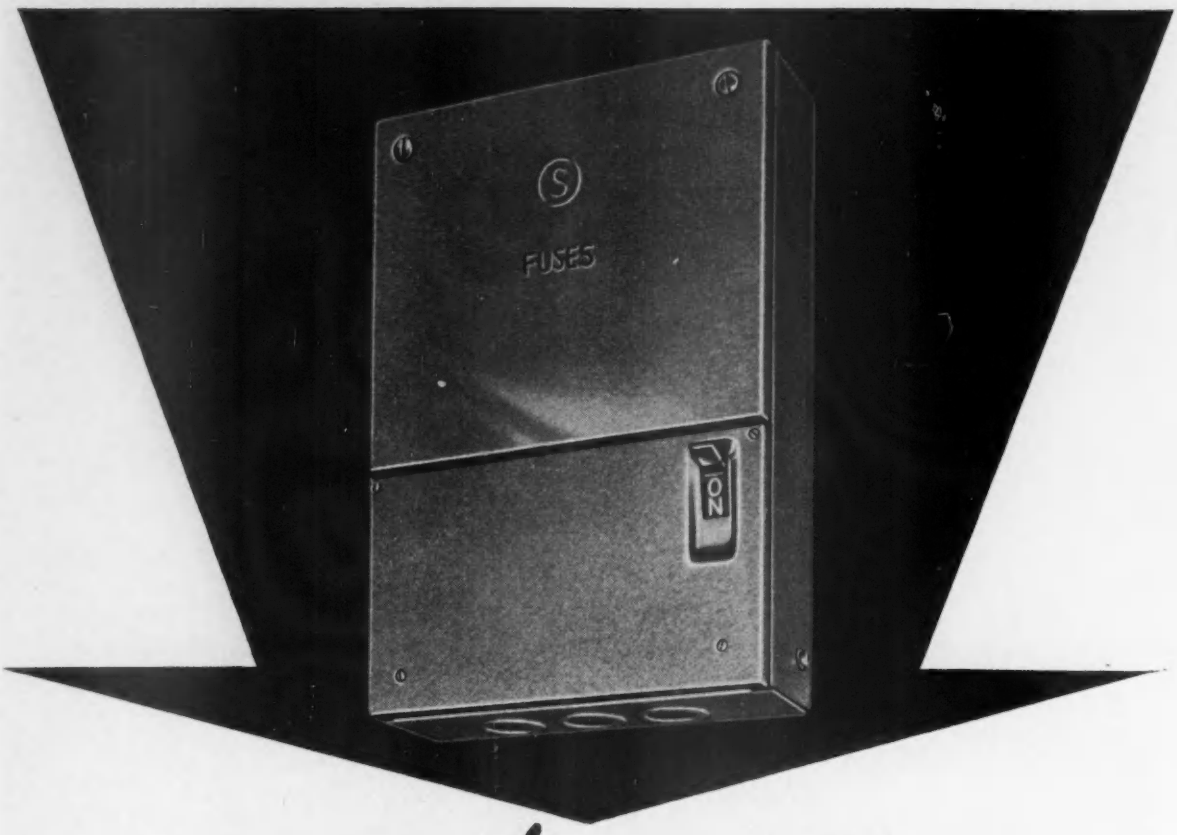

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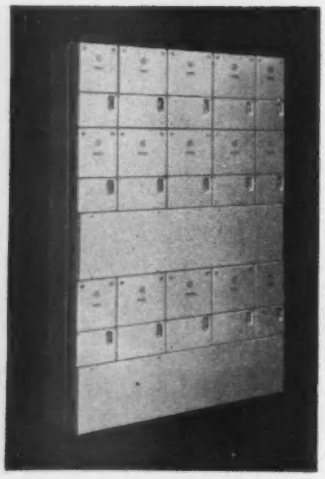

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NEWS SHEET

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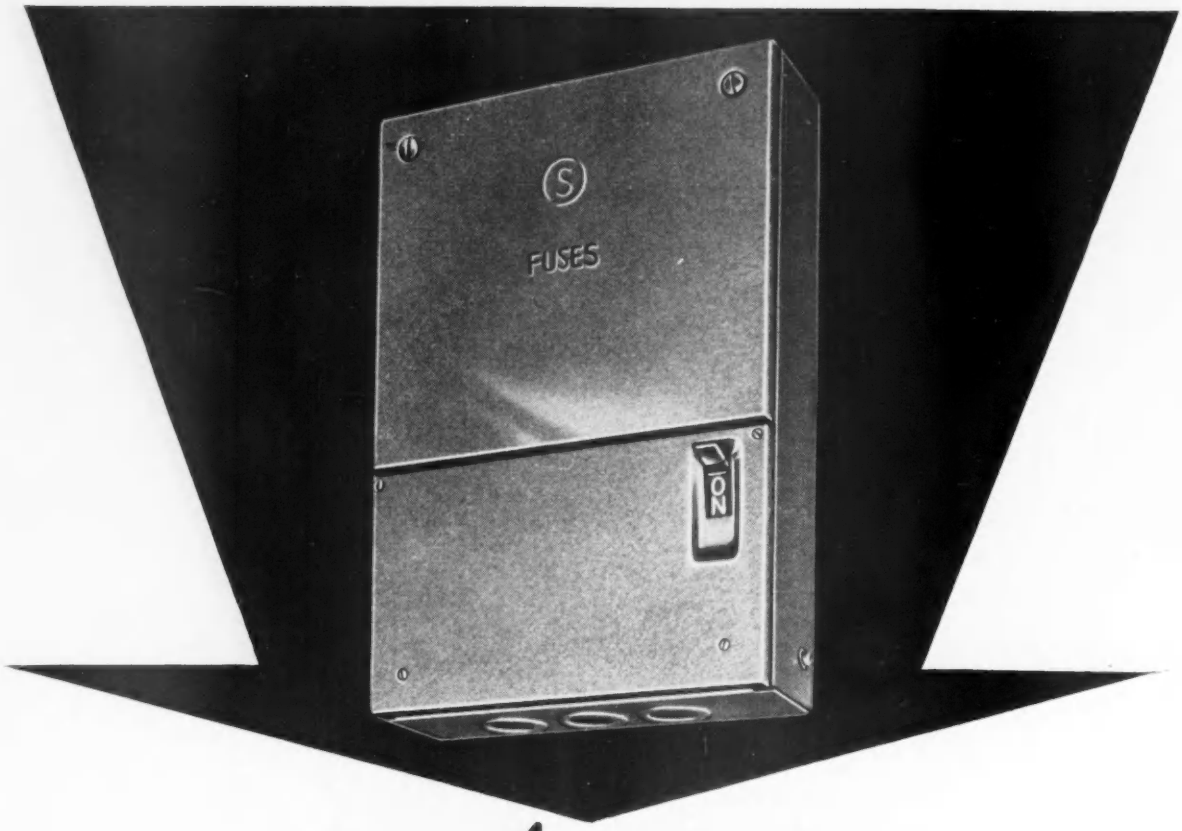

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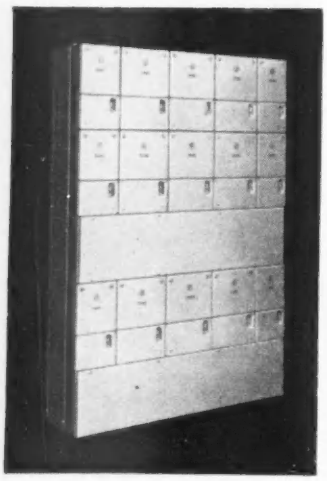

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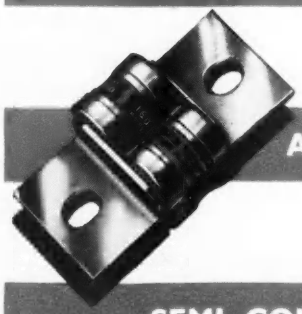
ELECTRICITY SUPPLY

DOMESTIC CONSUMERS' UNITS

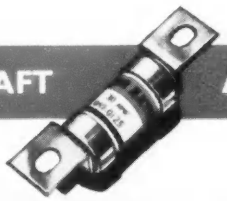
PLUGS

TRACTION

RAILWAY SIGNALLING



AIRCRAFT



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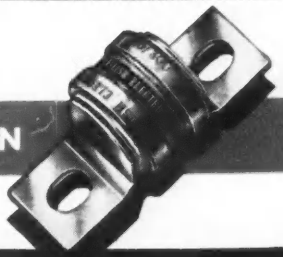

SEMI-CONDUCTOR RECTIFIER PROTECTION

THE STANDARD OF QUALITY AND PERFORMANCE THE WORLD OVER

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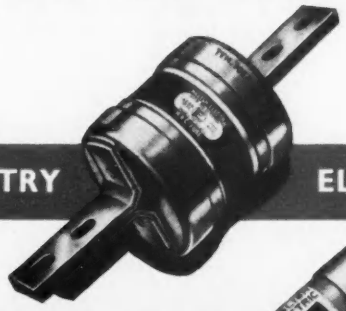

INDUSTRY

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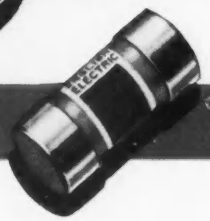

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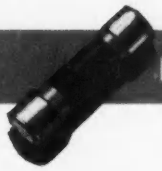

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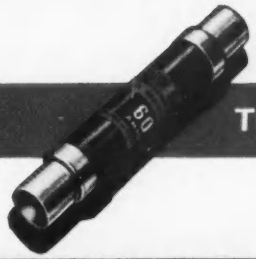

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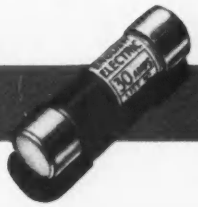

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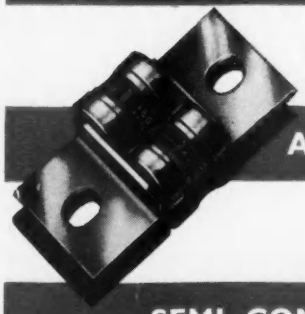

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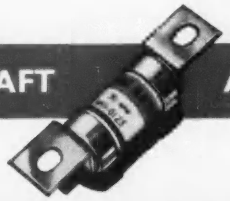

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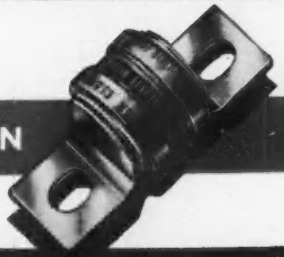

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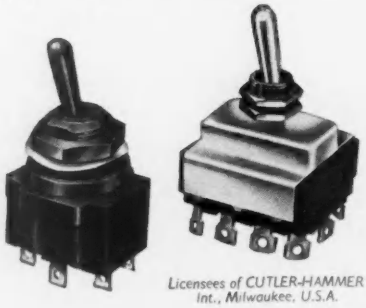

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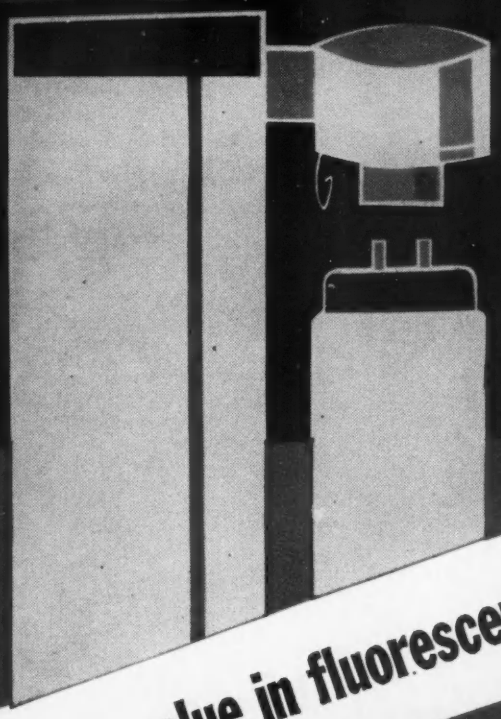

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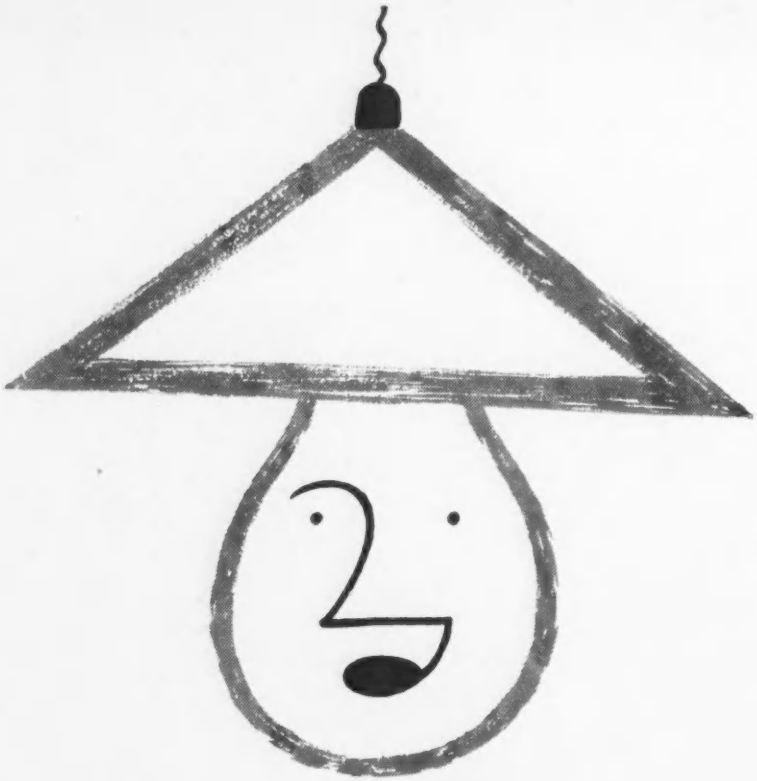
Slim Jim must be your fastest-selling most profitable fluorescent unit because it is the easiest to fit, the most attractive in design, and the finest all-round value for money; and because full scale national advertising supports you all the way. Ask your local G.E.C. office or showroom for full details now.

LIGHTING & HEATING GROUP
THE GENERAL ELECTRIC CO. LTD
MAGNET HOUSE, KINGSWAY, WC2



HEY!

I'M WASTING YOUR MONEY

I can't compete against sunlight, you know! In fact, I look so dim in daylight that they keep forgetting to switch me off. But I'm still bright enough to see that I'm wasting electricity! Why don't you fit a **SAVELITE**? Why not indeed? The 'Savelite' is a new photo-electric device which warns factory and office workers when to switch off unnecessary lights. Easily and cheaply installed in individual offices and workshops, it cuts electric light bills to the barest minimum, and saves its cost in a very short time.

A 'Savelite' is a neat little photo-electric unit that fits in the window and literally watches daylight and tells you when artificial lighting is not required. Take a walk round your works - it may surprise you to see how much money is being wasted on unnecessary lighting (lights which they have **forgotten** *to switch off!). The 'Savelite' unit costs only 23 gns. - quickly saved out of your electricity bill.*

CUT **THOSE ELECTRICITY BILLS BY INSTALLING**

SAVELITE

IT REACTS TO LIGHT AS A THERMOSTAT REACTS TO HEAT

Full details from:

RADIOVISOR PARENT LTD., Stanhope Works, High Path, London, S.W.19 *Telephone:* CHErrywood 3351

RADIOVISOR MAKERS OF ELECTRONIC CONTROLS SINCE 1927

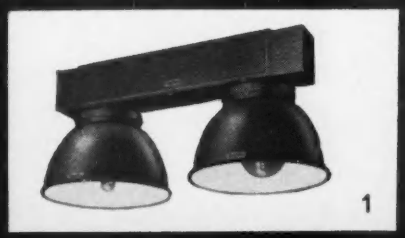
If it's a question of lighting . . . leave it to Simplex

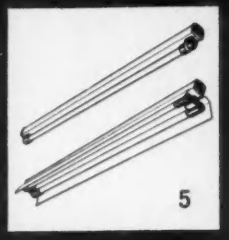
Notice we say lighting — not lighting fittings. We supply the right lighting equipment for a diversity of industrial applications. But, you are interested in the end, not the means. You want the right amount of light in the right place at the right time. And once the job is done you want to forget it.

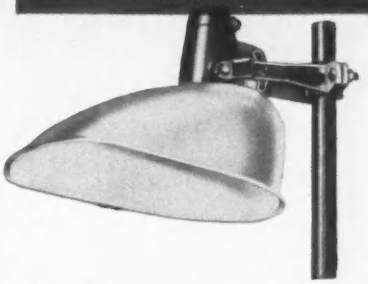
So like so many people nowadays, you call in Simplex first. After all, it's only common sense to ask the experts in industrial lighting how your objective can best be achieved, which type of light fittings are ideal for the job, how many you need, where they should be located. There is no obligation of course.

Here's what to do: Reach for your telephone book. Look up your local Simplex branch. Ask them to send someone round for an informal discussion.

1 Simplex Blended High-Bay Fitting
2 Simplex Fiesta-Flood
3 Simplex Wall Bracket Screwglass Fitting
4 Simplex Dispersive Reflector
5 Simplex ACF (Anti-corrosion Fluorescent) Fitting







Simplex

SIMPLEX ELECTRIC COMPANY LIMITED
CREDA WORKS, BLYTHE BRIDGE, STOKE-ON-TRENT, STAFFS.
Branches throughout Great Britain and Agents throughout the World

Detailed literature available on request

ELECTRICAL DIVISION L.11

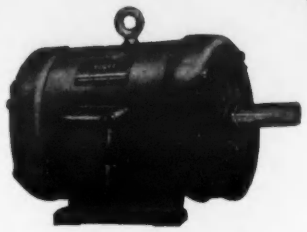
SCOTT

A.C. & D.C.

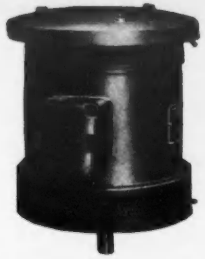
MOTORS

MANUFACTURERS OF

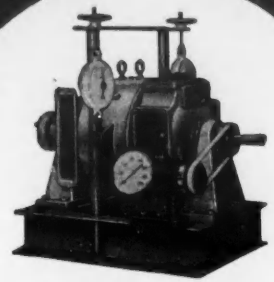
A.C. MOTORS ½-350 B.H.P., D.C. MOTORS ½-200 B.H.P.
ALTERNATORS ½-125 K.V.A., MOTOR GENERATOR SETS
GENERATORS ½-150 K.W., INVERTED ROTARY CONVERTERS
MARINE MOTORS, ETC.



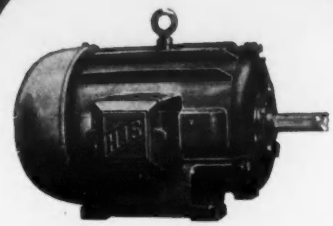
A.C. DRIP PROOF MACHINE



A.C. VERTICAL FLANGE TYPE



DYNAMOMETER FOR COLLEGE USE



TOTALLY ENCLOSED FAN-COOLED MOTOR

HUGH J. SCOTT & CO. (BELFAST) LTD., VOLT WORKS, BELFAST, 6, N. IRELAND

TELEPHONE: BELFAST 57225 (6 lines)

TELEGRAMS: AMPERES, BELFAST

From Stock

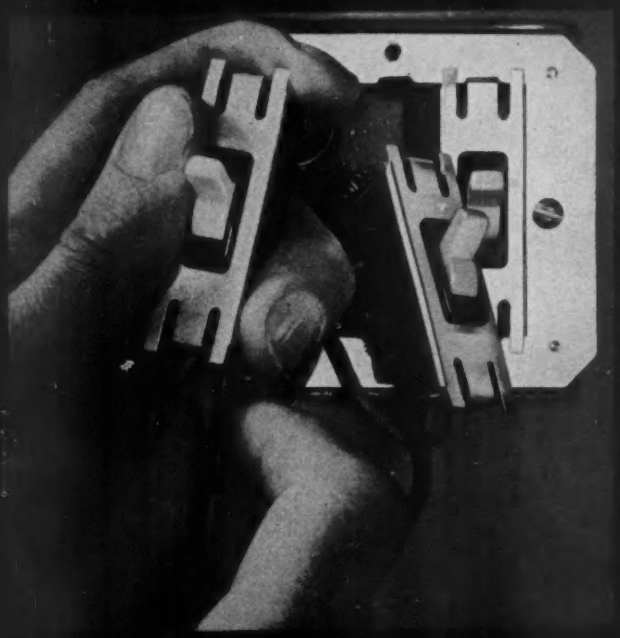
Ferranti MOVING COIL

Throughput kVA	Phase	Type
30	3	Pole Mounting
60	3	Pole Mounting
60	3	Feeder Pillar
95	3	Feeder Pillar
135	3	Feeder Pillar
20 (Multi-Range)	1	Pole Mounting
30 (Multi-Range)	1	Pole Mounting
50 (Multi-Range)	1	Pole Mounting
60	1 (3-wire)	Pole Mounting

FERRANTI LTD · HOLLINWOOD · LANCASHIRE Tel: FAIlsworth 2000
London Office: KERN HOUSE, 36 KINGSWAY, W.C.2. Tel: TEMple Bar 6666

FT 257/2

under 3 minutes to wire and clip-in a 3-gang switch . . .



'MUTAC CLIPPER'

G.E.C. Installation Equipment Group have a *new approach* to designing switches. This makes 'Mutac Clipper' switches unrivalled for ease and speed of installation . . . ensures that these precision-made, electronically-tested switches give a guaranteed long-life performance . . . takes the clicking out of switching. G.E.C.'s *new approach* enables you to put up to 3 'Mutac Clipper' switch units into a standard BS 1299 or plaster depth box. There's a choice of 44 different switch plates—in moulded plastic or metal—and 11 interchangeable switch units fit into just 3 different sized grids and boxes.

5 amp 1 way S.P.
15 amp 1 way S.P.
5 amp 1 way D.P.
5 amp 2 way S.P.
5 amp 2 way & off
5 amp intermediate
5 amp 1 way secret
5 amp 2 way secret
Bell Push
Neon Indicator
Blanking Unit

'Mutac Clipper' switches cost no more than ordinary switches to buy and far less to install—that's a result of G.E.C.'s *new approach.* Complete interchangeability of 'Mutac Clipper' enables you to standardise right through a job.

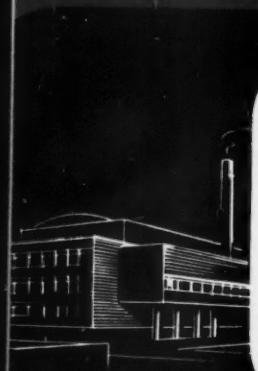
that's the New Approach of G.E.C.

IMMEDIATE DELIVERY

of all 'Mutac Clipper' switches from wholesalers throughout the country. If you would like more detailed information ask your wholesaler for 'Mutac Clipper' literature.

G.E.C. INSTALLATION EQUIPMENT GROUP · FOUR ASHES · WOLVERHAMPTON

Pyrotenax Warming Cable for all-round heating economy

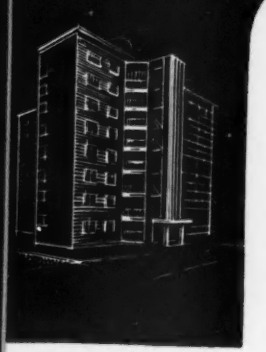


in FLOORS

The most popular form of space heating as full advantage can be taken of cheap off-peak rates. Floor warming is especially suitable for constant warmth.

in WALLS

The compactness of "Pyrotenax" cable means that no additional thickness of plaster rendering is needed. For background or general heating "Pyrotenax" is applicable to new or existing buildings.



in CEILINGS

A "Pyrotenax" warmed ceiling provides comfortable heating within minutes from the large unobstructed surface area. It is especially suitable for economical heating of individual rooms.

GD 742

The use of the trade name "Pyrotenax" is exclusive to the products of this Company and its associates.

Pyrotenax
REG° TRADE NAME

PYROTENAX LIMITED Hebburn-on-Tyne · Telephone Heb 83-2244/8

AREA OFFICES AND DEPOTS: **LONDON:** *VICtoria 3745* · **BIRMINGHAM:** *MIDland 2924* · **MANCHESTER:** *Deansgate 3346/7* · **LEEDS:** *Leeds 27826*
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J. & P. *service*

makes short work

of tall orders

J. & P. are large enough to make
a very wide range of cables . . . but not
too big to give individual attention
to each customer's requirements

JOHNSON & PHILLIPS LTD.

ELECTRICAL ENGINEERS AND CABLE MAKERS

CHARLTON, LONDON, S.E.7

Aldwych WC2 Belfast Birmingham
Bradford Bristol Cardiff
Edinburgh Exeter Glasgow
Ipswich Manchester Newcastle
Nottingham Portsmouth Sheffield

FACTORIES IN GT. BRITAIN, AUSTRALIA, SOUTH AFRICA, INDIA AND PAKISTAN

Wiring and Control Cables
insulated with rubber,
p.v.c., polythene, butyl or
silicone rubber.
Mains Cables
insulated with paper,
varnished cambric or p.v.c.
Cables for Special Purposes

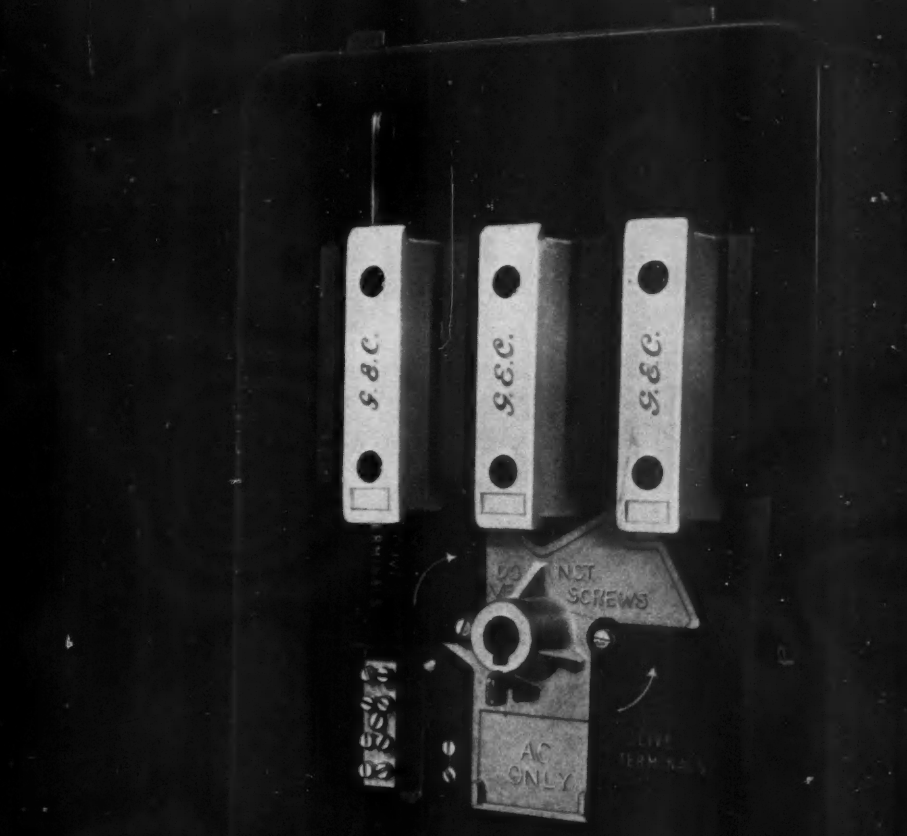
'HIDUTAC' switchfuses pack more space into a smaller size

Radial positioning of the contacts of 'Hidutac' switchfuses allows a *unique compactness*. This is just one of many 'Hidutac' exclusive features resulting from G.E.C. Installation Equipment Group's *new approach*, based on many years' experience of making switchgear superbly well. The 60 amp. TPN 'Hidutac' measures only $13\frac{3}{16} \times 8\frac{1}{2} \times 4\frac{1}{2}$ in. yet there is still generous wiring space and easy access to the terminals at the front.

Consider these other impressive advantages : *Unlimited full load switching*—'Hidutac' switchfuses operate at their full load current with unfailing reliability. *High breaking capacity*—8 times the rated full load current—through cam-operated, double-break, silver contacts. *Total internal enclosure* of all moving parts, with shields over live terminals. *High fault current protection* in Single Pole and Neutral, Double Pole, Triple Pole, Triple Pole and Neutral switchfuses with H.R.C. or rewirable fuses. Categories of duty are: H.R.C. fuses, all ratings, AC4 of BS88 (33,000 amp.); rewirable fuses, 15 and 30 amp. ratings, S2A of BS3036 (2,000 amp.); rewirable fuses, 60 amp. rating, S4A of BS3036 (4,000 amp.). *Modern styling* of pressed steel case with fully interlocked cover.

These exclusive features make 'Hidutac' switchfuses vastly superior for tungsten and discharge lighting control, motor control, and transformer and capacitor switching.

***IMMEDIATE DELIVERY** of 'Hidutac' switchfuses from wholesalers throughout the country. For more detailed information ask your wholesaler for 'Hidutac' literature.*



that's the New Approach of G.E.C.

INSTALLATION EQUIPMENT GROUP

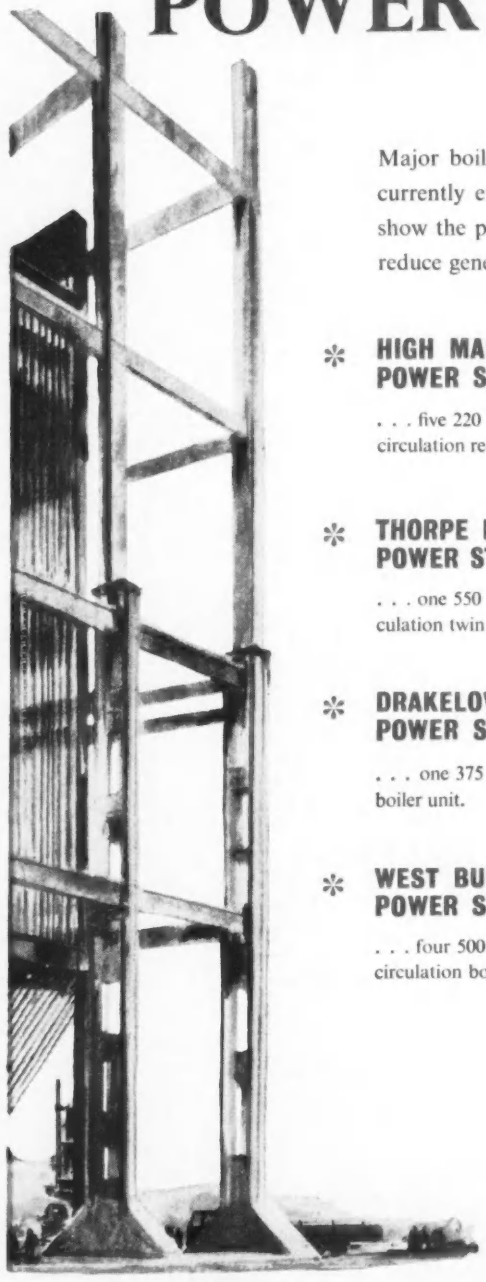
1961

Congratulations to BEAMA, who are celebrating their Golden Jubilee, from REYROLLE, one of their founder-members, who are themselves celebrating the Diamond Jubilee of the incorporation of the Company on Tyneside

Reyrolle

A. Reyrolle & Company Limited Hebburn - County Durham - England

PROGRESS IN POWER PLANT DESIGN



Major boiler contracts in which International Combustion Limited are currently engaged for the Central Electricity Generating Board, clearly show the pattern of development adopted to achieve greater output and reduce generating costs.

✲ **HIGH MARNHAM POWER STATION**

. . . five 220 MW controlled circulation re-heat boiler units.

EVAPORATION	STEAM TEMPERATURE
1,400,000 lb/hr	1,060°F
STEAM PRESSURE	RE-HEAT TEMPERATURE
2,450 lb per sq. in.	1,005°F

✲ **THORPE MARSH POWER STATION**

. . . one 550 MW controlled circulation twin furnace boiler unit.

EVAPORATION	STEAM TEMPERATURE
3,750,000 lb/hr	1,055°F
STEAM PRESSURE	RE-HEAT TEMPERATURE
2,400 lb per sq. in.	1,055°F

✲ **DRAKELOW 'C' POWER STATION**

. . . one 375 MW super-critical boiler unit.

EVAPORATION	STEAM TEMPERATURE
2,500,000 lb/hr	1,110°F
STEAM PRESSURE	RE-HEAT TEMPERATURE
3,650 lb per sq. in.	1,055°F

✲ **WEST BURTON POWER STATION**

. . . four 500 MW re-heat controlled circulation boiler units.

EVAPORATION	STEAM TEMPERATURE
3,450,000 lb/hr	1,055°F
STEAM PRESSURE	RE-HEAT TEMPERATURE
2,400 lb per sq. in.	1,055°F

These contracts are significant stages in the International Combustion contribution to power supply in Great Britain, and are supported by many large overseas contracts and for nuclear power plant.

INTERNATIONAL COMBUSTION LIMITED

NINETEEN WOBURN PLACE, LONDON, W.C.1. TELEPHONE TERMINUS 2833 WORKS: DERBY

C.E.I.

When you specify Class H insulated motors you are taking a big step in reducing your maintenance problems.

Class H insulation has ten times the life of Class B insulation when working under the same conditions, so the risk of insulation failure—a major cause of motor breakdowns—is virtually eliminated.

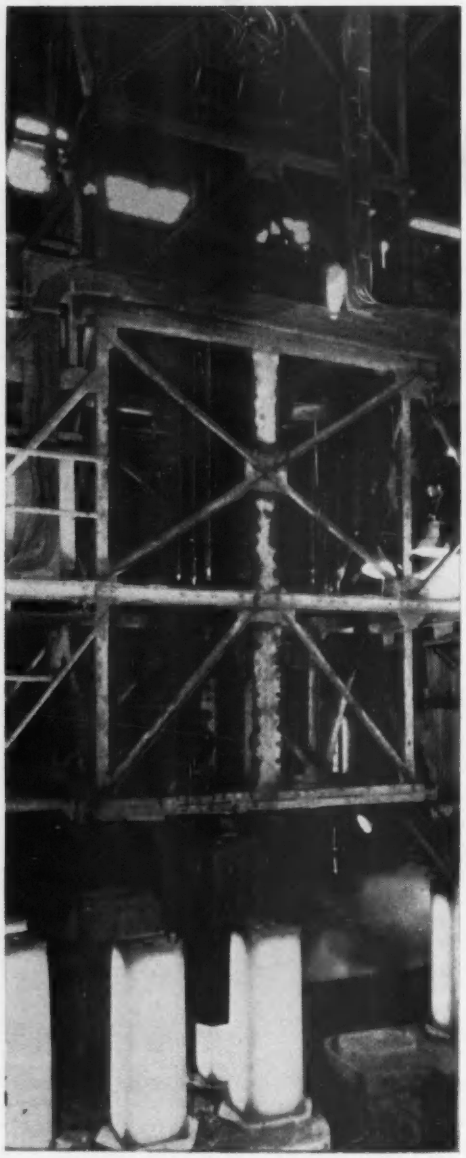
No matter how testing the working conditions, Class H motors will take the strain: you can safely subject your Class H motors to high humidity, scorching heat and heavy overloads. And it is often possible to choose a Class H motor of lower capacity than a Class A or B machine, because it is far more resistant to overload.

The advantages of Class H silicone insulation (to BS 2757) are by no means restricted to new machines. Many failing motors have been transformed into trouble-free units by a timely silicone Class H rewind.

Proved by tests: Continuous running tests have proved, that the insulation life of Class H motors outlasts both Class A and B insulation by *more than ten times.*

next time—try a Silicone Rewind

MS



CHOOSE THE MOTOR WITH H IN IT

£2,000 SAVED

with ONE Class H rewind

27 breakdowns in seven years. The cause? Insulation failure. The electric motor on a four-ton stripper crane at Workington Iron and Steel Company kept breaking down, so in 1953 the 50 hp Class A motor was replaced by a Class B insulated motor of the same rating specially designed for heavy duty—but there were still 5 insulation breakdowns over the next three years.

Because of production losses and the cost of rewinds the motor was finally rewound in 1956 with Class H insulating materials—silicones combined with glasscloth and mica.

Result? In the words of Workington Iron and Steel Company, 'No breakdowns since that date'. A saving of £2,000 in rewind costs with *no* further losses in production due to insulation failure.

These firms make Class H motors:-

Associated Electrical Industries Ltd · The English Electric Co. Ltd · The General Electric Co. Ltd · Bruce Peebles & Co. Ltd · Woods of Colchester Ltd · Brook Motors Ltd Lancashire Dynamo & Crypto Ltd · Brush Electrical Engineering Co. Ltd · Howells Electric Motors Ltd · Laurence, Scott and Electromotors Ltd.

Contact your nearest Midland Silicone area office, and ask for a list of rewinders who carry out silicone rewinds. Also ask for a copy of our news bulletin: 'MS News for Industry'.

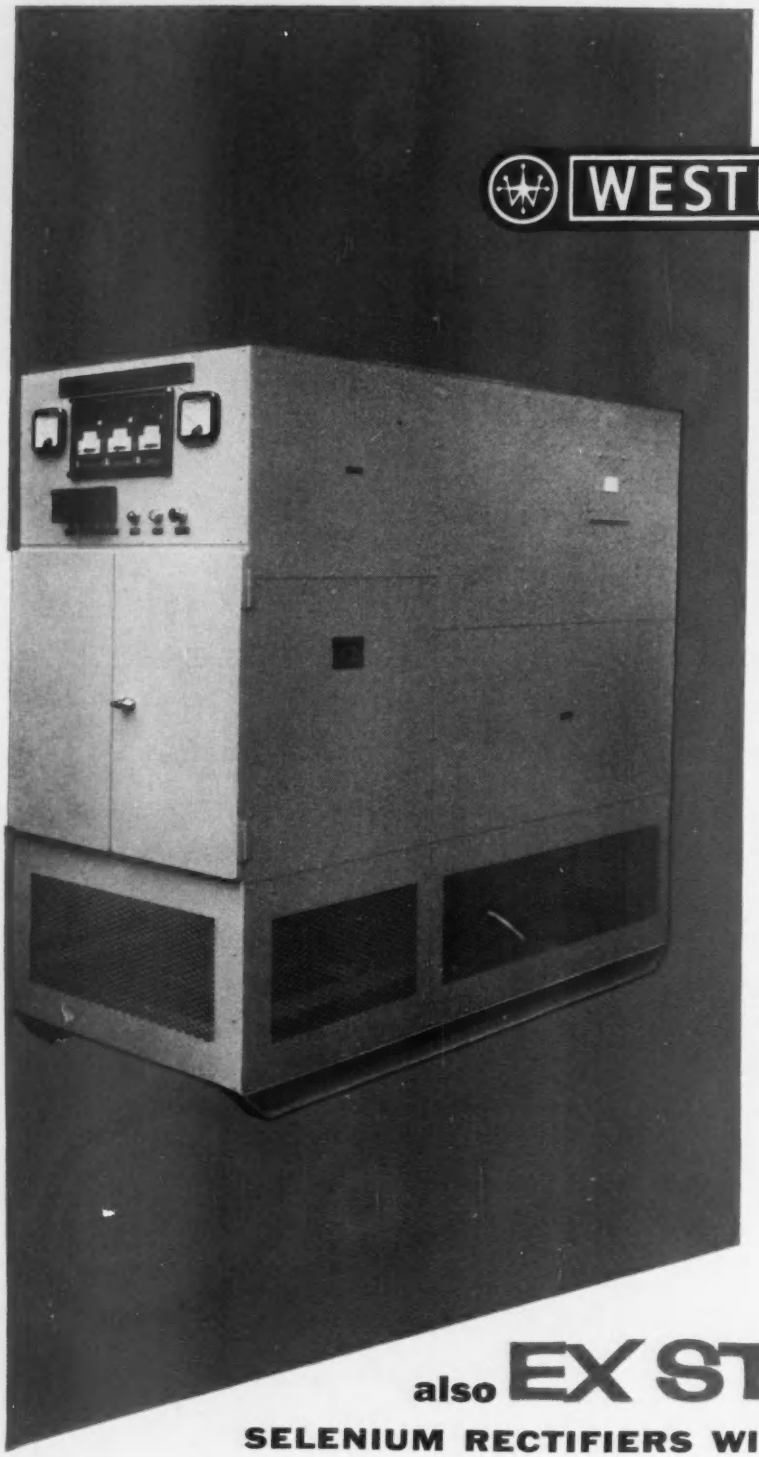
MS

MIDLAND SILICONES LTD *first* in British Silicones

(Associated with Albright & Wilson Ltd., and Dow Corning Corporation)

68 KNIGHTSBRIDGE · LONDON · SW1 · TELEPHONE: KNIGHTSBRIDGE 7801

Area Sales Offices: Birmingham, Glasgow, Leeds, London, Manchester. *Agents in many countries.*



WESTINGHOUSE

SILICON POWER CONVERSION PLANT

20 to 500 kW d.c. for general industrial service

- A complete range of 200/250 and 400/500 volt rectifier equipments are fully described in Engineering Publication 837/1.
- Short delivery requirements for d.c. supplies of from 20 to 120 kW at 400/500 volts can now be met from stock production.
- Westinghouse also invite your enquiries for silicon rectifier equipment complete with transformers for large power requirements exceeding 500 kW d.c. at medium voltages.

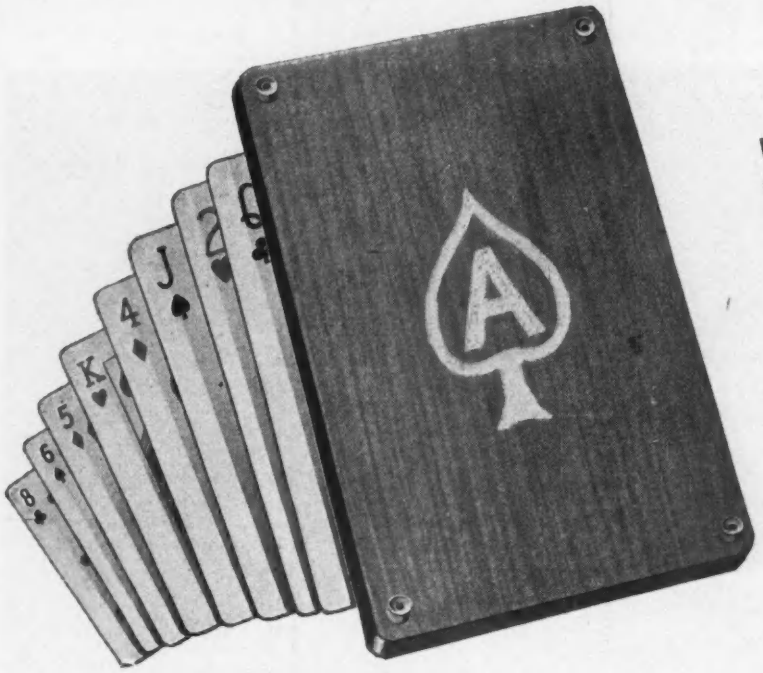
also EX STOCK

SELENIUM RECTIFIERS WITH TRANSFORMERS

with d.c. outputs from 50 watts to 10 kW in the popular voltage ranges 100/120, 200/250 and 400/500 volts for single—or three-phase operation are readily supplied.

For full details please write to Dept. ET 8/61, Rectifier Division, Industrial Equipment.

WESTINGHOUSE BRAKE AND SIGNAL CO. LTD 82 YORK WAY · KING'S CROSS · LONDON N1 · TERminus 6432

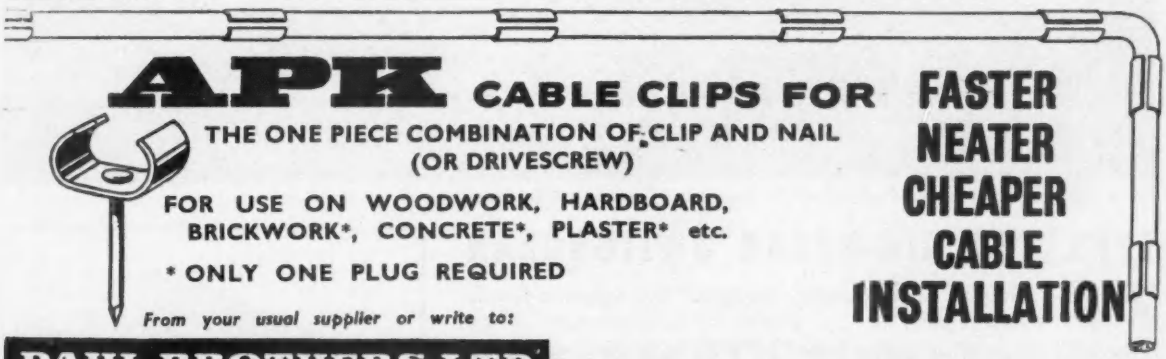


Wootton meter boards are Trumps!

Naturally . . . when they're Wootton-made . . . and Wootton tested! They're made of the best plywood Wootton could lay hands on. Tested for reliability . . . toughness . . . durability. Wootton meter boards stand up to anything. Even in the most extreme climates. No contraction or expansion or warping with Wootton! Oh, and there's more to Wootton than just meter boards. They make wood blocks too, and instrument cases, and they're aces at sunk switch boxes.

WOOTTON–the meter board people

WOOTTON & CO. LTD
ALMA WORKS · PONDERS END · MIDDX
Telephone: HOWard 1858



APK CABLE CLIPS FOR

THE ONE PIECE COMBINATION OF CLIP AND NAIL (OR DRIVESCREW)

FOR USE ON WOODWORK, HARDBOARD, BRICKWORK*, CONCRETE*, PLASTER* etc.

* ONLY ONE PLUG REQUIRED

FASTER NEATER CHEAPER CABLE INSTALLATION

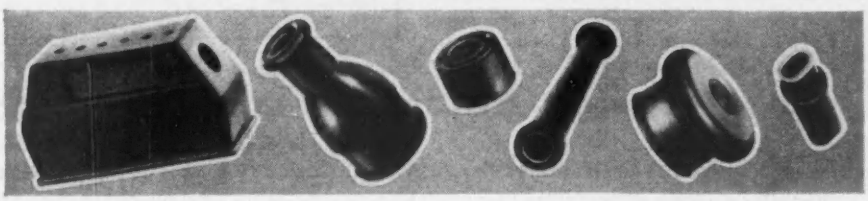
From your usual supplier or write to:

DAHL BROTHERS LTD

21 MORLEY STREET, LONDON S.E.1. WATerloo 4075 (P.B.X.)

SPECIALISATION PLUS OVER 60 YEARS' EXPERIENCE

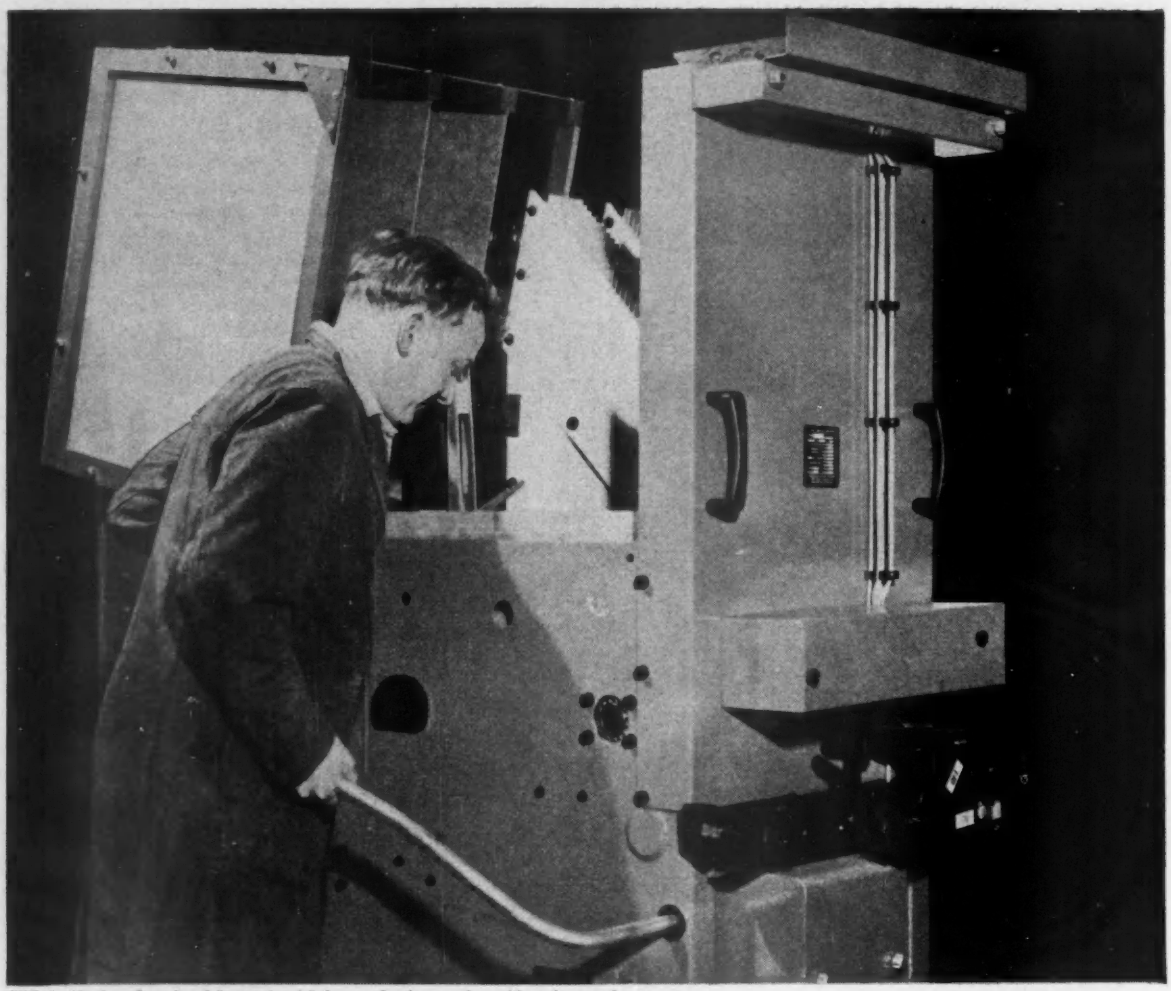
adds up to the *Dainite Service* IN MOULDED RUBBERS



Your individual requirements are our concern, from the original technical advisory service through to the finished product which suits the job. Your enquiries will be attended to promptly. Fully approved A.I.D. and A.R.B.

THE HARBORO' RUBBER CO. LTD. Dainite Mills, Market Harborough. Tel: 2274-5-6

D



HSA Air-break unit with truck withdrawn for inspection of breaker and contacts.

TYPE HSA AIR-BREAK SWITCHGEAR

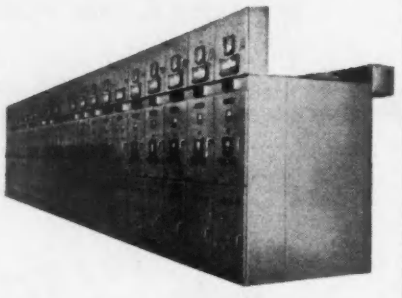
Considering unit-type, interchangeable switchgear? It is logical to turn to the wide resources of AEI.

Type HSA air-break switchgear from AEI is designed for power station auxiliaries, industrial supply systems and heavy plant.

It is of the horizontal draw-out truck pattern . . . jig-built for interchangeability and completely air-insulated . . . with integral earthing facilities and unit-type construction.

Type HSA Switchgear has been fully tested to comply with BS requirements of 3.3 kV and the American standard service voltage of 4.16 kV.

▪ 3·3 kV British Standard Requirement. 150 MVA and 250 MVA ▪ 4·16 kV American Service Voltage. 250 MVA ▪ Current Ratings: 800, 1600 and 2400 amp.



Overall view of HSA Air-break switchgear

For further details get in touch with the Switchgear Division, Trafford Park, Manchester 17, or your local AEI office.

AEI

Associated Electrical Industries Ltd.

Switchgear Division

TRAFFORD PARK, MANCHESTER. HIGHER OPENSHAW, MANCHESTER. WILLESDEN, LONDON

F/A022

THURSDAY 26 OCTOBER, 1961
Registered as a Newspaper Volume 140 No. 17

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telegrams: Equivolt . Estrand Telephone: HOLborn 6016

Dans ce numéro

Les prévisions météorologiques aident à améliorer le chauffage 605

Un projet a été proposé pour le contrôle de chauffage électrique à accumulation pendant les heures creuses: la quantité de chaleur absorbée par l'immeuble à chauffer pendant la nuit serait déterminée par les prévisions météorologiques pour la journée précédente. Afin de déterminer l'importance des effets qu'ont les différentes conditions météorologiques sur les immeubles de construction différente, on procède actuellement à des expériences sur un bâtiment spécialement construit qui comporte des murs en briques, en verre et en béton léger.

Centrale électrique Drakelow B 607

La centrale électrique Drakelow B comprend quatre turco-alternateurs de 120 MW fonctionnant sur un cycle à vapeur surchauffée. Les turbines sont des machines à action à trois cylindres étudiées pour de la vapeur à 106 kg/cm², 538°C et de la vapeur resurchauffée à 25,5 kg/cm², 538°C. Les quatres chaudières à chaleur rayonnante sont chauffées par du combustible pulvérisé et sont étudiées pour produire 390 tonnes/heure de vapeur à partir d'une eau d'alimentation à 224°C. La centrale se trouve à proximité d'une centrale de 240 MW déjà sur place; une autre centrale avec deux turbo-alternateurs de 375 MW, qui fonctionnera avec de la vapeur à l'état supercritique, est en cours de construction près des deux centrales.

Oscillations des lignes aériennes 615

Les oscillations qui se produisent dans les lignes aériennes à grand espacement se sont avérées être dues aux effets aérodynamiques des rafales dirigées à un certain angle par rapport à la direction des conducteurs. Sur une ligne de 1720 mètres de long, les oscillations atteignirent une amplitude de 11 mètres à la verticale. Les effets peuvent être réduits par l'usage d'un conducteur ayant une surface extérieure lisse et cylindrique, au lieu d'une surface torsadée.

In dieser Nummer

Heiztechnische Verbesserungen durch Wettervorhersage 605

Es wurde ein Plan zur Steurung elektrischer, ausserhalb der Spitzenlastperiode betriebener Hitzespeicherungssysteme vorgeschlagen, nach dem die einem Gebäude während der Nacht zugeführte Heizleistung von der Wettervorhersage und dem Wetter des vorangehenden Tages bestimmt werden soll. Um die Grösse der Auswirkung verschiedenartiger Wetterlagen auf Gebäude andersartiger Bauweise zu bestimmen, wird jetzt mit einem Versuch an Hand eines eigens hierfür errichteten Gebäudes begonnen, dass Ziegel-, Glas- und Leichtbetonwände besitzt.

Das Drakelow B Kraftwerk 607

Das Drakelow B Kraftwerk umfasst vier 120 MW-Turboalternatoren, die mit einem Dampfwiederaufheizungskreislauf arbeiten. Die Turbinen sind Dreizylinder-Impulsreaktionsmaschinen, die für Drücke von 106 kg/cm² bei 538°C, mit Wiederaufheizung unter 25,5kg/cm² bei 538°C, ausgelegt sind. Zur Beheizung der vier Strahlungskessel wird pulverisierter Brennstoff verwendet, und die Kessel haben eine Verdampfkapazität von 390 Tonnen pro Stunde bei einer Speisewassertemperatur von 224°C. Das Werk schliesst sich an ein bereits vorhandenes 240 MW Kraftwerk an, und ein weiteres Werk, das mit überkritischen Drücken arbeitende 375 MW-Sätze umfassen soll, wird in der Nähe errichtet.

Freileitungsschwingungen 615

Die in Freileitungen mit langen Spannweiten hervorgerufenen Schwingungen sind auf aerodynamische Wirkungen zurückzuführen, die dann hervorgerufen werden, wenn ein böiger Wind schräg auf den Leiter einwirkt. An einer 1720 m langen Leitung erreichten Schwingungen eine Vertikalamplitude von 11 m. Die Wirkung kann durch Verwendung eines Leiters mit glatter, zylindrischer Aussenfläche anstatt einer verseilten Aussenfläche herabgemindert werden.

Lighting in the Modern Office 597
by S. L. Lyons, DIP.M.I.E.S., L.S.I.A.

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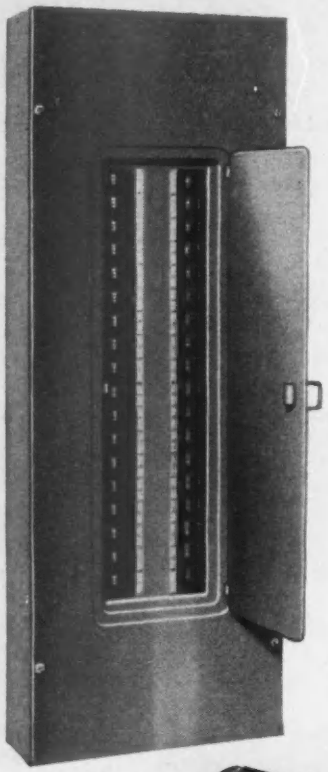

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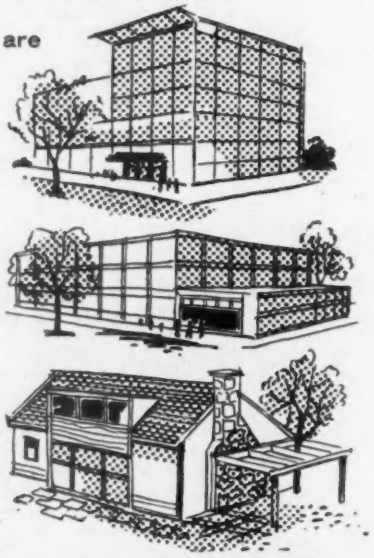

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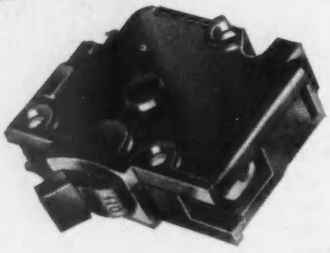

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ELECTRICAL TIMES

ESTABLISHED 1891

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Comment

WHAT PRICE TRANSFORMERS?

Final formalities have now been completed by the CEGB to order two 90 MVA, 132/33 kV transformers from Canadian General Electric. The Board have presumably taken this step in the absence of any substantial price reduction following the Restrictive Practices Court's proscription last March of the Transformer Manufacturers' price-fixing agreement. Although the price for the Canadian-built transformer has not been disclosed, it seems sure to be below the British figures or the operation would have little meaning. Yet if it is below, one of the findings of the RP Court is brought into dispute again. The Court refused to uphold the agreement as necessary to give manufacturers equal bargaining powers with the CEGB and the area boards, because of an "absence of disposition on the part of the CEGB to force unreasonable terms." Indeed, the Court went further than that and found that the supply authorities were not actively working to depress prices. They clearly are doing so now, and what the outcome will be an important matter for more than the large transformer manufacturers. The view is held widely that the manufacturers keep up prices for large transformers not only to meet their high content of expensive research-gained know-how, but also to carry the cost of continuing to make low-profit, small transformers. If the CEGB manages to force down prices of large transformers, as has occurred in North America, then some disturbance further down the line is probable. In evaluating the position it is necessary to keep in mind that ability to supply the odd transformer at a low price does not mean that much of the CEGB requirements could be obtained from overseas. Also, the CEGB, with its expanded generating programme, is going to need a rapid step up in its transformer supply—a factor on the side of the manufacturers.

EXHIBITING FOR EXPORTS

Since the war this country has never been happy with its exhibition policy. The absence of a satisfactory centre and the fading away of the BIF under unrealistic management have forced development towards the industry-by-industry specialist exhibitions. These fit in well with available accommodation and have proved popular with buyer and manufacturer alike. Such exhibitions, however, cannot have the impact overseas of a broadly based trade fair; they tend to be too inbred for a large exporting nation. Now a limited step is being taken towards a broadening of coverage of the Engineering and Marine Exhibition. In recent years this has been extending its scope and title alike, but in 1963, by taking Earls Court

as well as Olympia, it will double the available floor area. The change of title to the London International Engineering Exhibition reflects the courageous intention of catering for the new European climate in British trade. What is more, the date has been subtly chosen to overlap the beginning of the Hanover Fair; it is hoped that overseas buyers on their way to Germany may be tempted to cross the Channel to see what Britain can do. While such an argument may be humbling to a great exporting country, the timing is certainly making the best of a bad job. Only experience will show whether this step will catch the imagination of buyers and the support of industry. The organisers make clear that they are looking to the electrical industry to fill a large part of Earls Court. Coming as it does about a month after the established Electrical Engineers' Exhibition, this will present a major commercial problem to electrical manufacturers, even though the scope of the two exhibitions remain different. The situation has the elements of the old danger of falling between two stools.

OFFICE LIGHTING WEEK

This week the British Lighting Council is mounting a major effort to convince the business man that he should give attention to artificial lighting in his offices. The advice that is being given has teeth, in the early prospect of statutory regulations under the Offices Act setting a minimum value of illumination. In smaller offices, particularly, the level may be above what the staff are having to endure at present. Yet, almost certainly, the statutory level eventually set will be below what is accepted as today's good practice by those informed in lighting matters—and in office management. So the electrical industry has a continuing task ahead of it, for which Office Lighting Week is no more than a launching platform. All sections of the industry stand to gain from the use of better lighting, and it is a service to the prospective customer to sell it. A sustained effort is called for, with the lighting firms and the contractors in the forefront. It needs to be backed up by other manufacturers and by the supply authorities. Without such a wholehearted effort a valuable opportunity may be lost. It is an opportunity that could extend beyond lighting sales. The way to make the effort is to keep talking about lighting in the modern concept and to be ready to back the talk with knowledgeable advice.

WEATHER CONTROL FOR HEATING

Closer control of heat input in off-peak electrical floor heating could add significantly to the attraction of this system for the building occupier. That view has been expressed frequently of late in this column and elsewhere. The way to closer control has seemed likely to come through more ingenious temperature-sensitive devices, able to take account of tomorrow's probable weather. Yet in the British climate surprises are always likely. Meteorological office forecasters get caught out—yet they are equipped to provide at any moment the statement of what is the most probable pattern of tomorrow's weather. This line of thinking has led the Electricity Council to envisage some measure of departure from thermostatically operated devices, towards reliance on computer-aided human intervention. Centralised decision about tomorrow's weather can be matched with telemetered instructions to floor heating control circuits, so that the most effective and economic pattern of switching can be applied each night. Such a scheme lies some way ahead, if it proves practicable at all. Meanwhile, the ERA is embarking on a necessary preliminary, an experimental investigation of the heating response of various types of building construction. The results will be fundamental to the weather-forecast-control scheme, and of the greatest value for any method of control. The more that is known about the details of building thermal behaviour the more chance there is of finding an "ideal" heating arrangement. But some caution is needed here. Simplicity as well as accuracy is desirable in control. Too much refinement of control could make storage heating look troublesomely complicated.

NEAR-ABSOLUTE PROMISE

Superconductivity has been a familiar physics phenomenon for many years, something which practical engineers did not have to worry about. Through developments in recent years, the electronics engineer has become involved with the strange behaviour of materials at very low temperatures. Now it seems that the turn of the power engineer may be coming, through developments in equipment design and through the availability of new materials. Thus, American engineers, it was reported recently, have evolved a transformer design that overcomes one of the basic shortcomings of superconductivity as a power engineering technique: that it is destroyed by too high a magnetic field across the conductor, or by too high a surface current density. Close interleaving of primary and secondary turns reduces the residual magnetic field sufficiently to permit superconductivity to be maintained once it has been induced, if short-circuit currents can be avoided. Some of the saving in materials and running losses would have to go on refrigeration plant—and the AIEE monthly, *Electrical Engineering*, carries a warning reminder that even the ideal refrigerator requires a 99 W input to remove 1 W of heat at 3° above absolute and reject it at summer-day ambient. But there is a lot of margin to play with. The same source estimates that a transformer of given geometrical size, using superconductivity, could have a rating ten to a hundred times as great as with normal copper conductors. Of still greater simplicity is the discovery of a material which seems capable of retaining its superconductivity even in the presence of strong magnetic fields.

Meteor

This week's quick summary of electrical news faces advertisement page 20

Lighting in the modern office

EFFICIENCY AND AMENITY FACTORS IN PLANNED SCHEMES

by S. L. Lyons, Dip.M.I.E.S., L.S.I.A.*

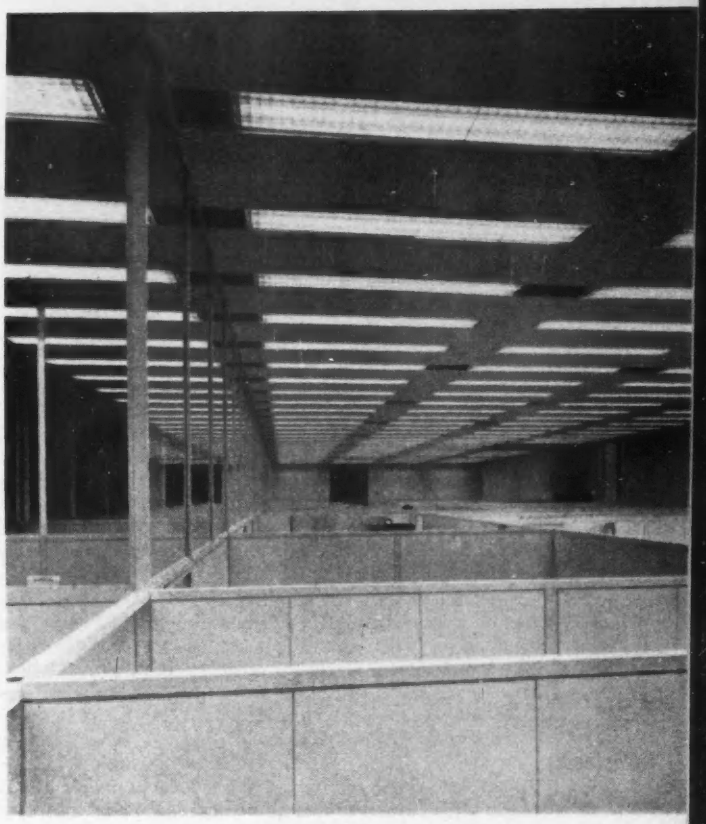
IN recent years there has been a great change in the appearance and function of offices, and the developments in the environments of office workers generally are such as to require a continual review of lighting techniques. The stages of growth in size and complexity of office establishments are connected with the advent of the typewriter, the telephone and the accounting machine. More recently, mechanisation of a high order has been introduced, involving computers, punch card machines and complex machine accounting systems which present lighting problems similar to some met in industry. Gone are the days when an office was merely any suitable room in which a desk and a filing cabinet could be conveniently accommodated; offices now frequently have a sales function, and are places where interviews and meetings of commercial significance may take place. Thus, the lighting has not only to achieve utility but may also have to assist in the creation of a "prestige interior."

The objective in these notes is to provide a reminder of some of the factors which may usefully be borne in mind by the lighting engineer in designing for offices and by users when choosing a lighting method. No attempt is made here to deal mathematically with illumination calculations, nor with the technical approach of "brightness engineering," although this technique will have an influence upon every design decision. Reference should be made to the 1961 edition of the Illuminating Engineering Society's Code.

When making general observations about office lighting, one must remember that an office suite may contain areas quite unlike ordinary executive or clerical offices. For example, there may be a lecture theatre, a demonstration room, a drawing office, a telephone switch room and various waiting and interview rooms which require special treatment. Additionally, there may be areas to be given individual treatment, such as the directors' suite or, maybe, a canteen or dining room. For the achievement of suitable standards throughout an office building attention must be given to the special requirements of the "forgotten areas," such as the duplicating room, the staff back staircase, the stationery store and the strong room, as well as the treatment of prestige areas such as the entrance and the managing director's office.

Prestige

Modern custom is to lavish large sums of money on the lighting of the vestibule and entrance, together with its associated staircases and main corridors. In many speculative buildings designed for multiple occupation, areas common to all occupants may receive very careful detailing by the architect as an aid to letting.



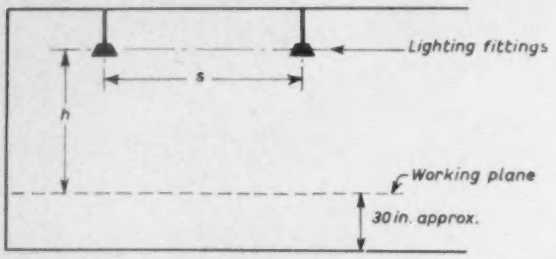
Lighting treatment of an open area subdivided by partitions into offices. The American Embassy, Grosvenor Sq, London (Atlas Lighting Ltd.)

In many modern office buildings, the architect makes such complex use of the floor space that it is quite difficult to know where the function of "office" finishes and the function of "prestige" or selling area or showroom begins. The lighting may be subordinated to the décor and it is essential that the lighting engineer maintains close liaison with the architect and interior designer. This is, of course, a hoary question and, in the case of speculative buildings, is most difficult to achieve as the user may be unknown until after the building (and the lighting installation) has been completed.

The prestige aspect of office interiors is particularly important for large organisations, where a client's visit is a useful step in building a "buying attitude" and respect for the company. Many offices which could be functionally simple are made elaborate and ostentatious purely because of this aspect, and the resulting interiors may range in their effect on the visitor from the breath-taking to the banal. Where the building has been given heroic proportions and an entrance on a magnificent scale, the lighting engineer must meet the challenge and produce lighting effects achieving results of the same magnitude.

It seems that all the usual rules of economy may be thrown to the winds when the client is out to impress! Closely spaced lines of recessed tungsten filament units, lavish colour effects and elaborate decorative fittings may be employed, all of which are for effect rather than function. Whether, as designers, we agree with this type of treatment is a moot point but there is a trend to lighting of this type.

* Lighting and Heating Group, General Electric Co. Ltd.



The fundamental elements in a planned lighting scheme

Architectural Influence

Since the war we have seen a revolution in the design of buildings. The seeds of this revolution were planted by architectural leaders such as Walter Gropius in Germany, Frank Lloyd Wright in America and Le Corbusier in France. Constructional methods have been revolutionised in this generation and, in response to increasing costs of land and labour, the economics of large buildings have been transformed by pre-stressed concrete, curtain walling, flooring and partitioning systems and many other new technical tricks.

From the lighting engineer's special view of architecture, the most important present trend is to "build high and build deep." This means that we must expect increased sky glare in offices above the district roof height. Whether permanent supplementary artificial lighting should be provided will be a fundamental question at the outset. (Incidentally, can we not simply call it "Daytime Artificial Lighting"?) Building methods influence the practical business or wiring ceiling fittings, for the common use of poured flooring means that the lighting outlet positions must be determined early in the work. Against this difficulty we may offset the advantages of false ceilings which are referred to again later. There is a tendency to use very shallow ceiling cavities, where the false ceiling is designed mainly for acoustics, and the concealment of electrical services is a secondary consideration.

The advent of lightweight curtain walling and steel framing has encouraged the tendency to build high; none the less, as buildings grow higher, so the net ceiling heights seem to get lower. In the past, ceiling heights of 12 ft to 14 ft were common, but it is rare to find a ceiling over 11 ft in a modern building and many are lower; this may make difficulties for the lighting engineer. The requirements of spacing-to-mounting-height ratio of lighting fittings may be impossible to satisfy unless a multiplicity of fittings is employed; in this respect continuous rows of fluorescent units are sometimes employed at spacing-to-mounting-height ratios of up to 2:1 between the rows.

A feature of design which has recently become important is the night appearance of the building. Architects seem to be more conscious of night appearances now and, whereas in the past their interest might have been limited to occasionally requiring floodlighting and exterior lighting, it is now common for an architect to demand the employment of one type of fitting only, and one colour of tube throughout a building. Further, it is frequently specified that all fittings which may be seen from the front of the building must be oriented in the same direction, to make a tidy appearance at night.

Referring now to the tendency to "build deep," mention has been made of the possibility of using artificial lighting to supplement natural light. There is, however, an associated problem which may be solved by "brightness engineering" techniques and the use of such supplementary lighting, namely, the unpleasant psychological circumstances where staff are employed at a very great distance from a window. It may be observed that, although there is an adequate level of illumination and the glare index may be of a satisfactory order, a feeling of insecurity and dissatisfaction with the environment may be felt if the staff can see a window but are not able to see out. This condition also occurs when the window-sill level is well above the district roof height, so that a seated worker gets a horizontal view from the window which shows nothing but sky. This must be dealt with by the use of carefully controlled interior brightnesses, and adequate perimeter lighting to give definition and form to the interior, perhaps by wall fittings, with valance or pelmet lights applied to the windowless walls. Further, it may be held that an interior without natural light is preferable to one where the staff look longingly at a distant window and feel a recurring urge to walk towards it to look out.

Installation Problems

In speculative building, it is the custom to install lighting outlets in the ceilings at 10 ft or 12 ft centres, in anticipation of the future tenant's requirements. This may result in an unacceptable diversity of illumination levels when the fittings are later added. Many modern fittings are designed to produce a high standard of comfort and a low glare index when mounted at a spacing-to-mounting-height ratio of 1:1 or 1¼:1 above the working plane. A preferable method is to provide a suitable trunking system above a false ceiling, so that connections may later be made in m.i.c.s. cable to the lighting points which are positioned as required. Similarly, it is the custom of most builders to install flush-mounted switches on columns or pilasters. On "open plan" buildings, where partitions are to be added later, this is not a wise procedure as partitions may ultimately be required on the centre line of pilasters which means removal of the switches before the conversion work can be done. It is better to provide switches of a flush pattern, which can be blanked over if required, only at the main doorway positions and to work on the assumption that switches for fittings in the areas partitioned off will be mounted on the demountable partitions.

Modular dimensional systems are commonly used, the basic unit often being 10 in. with a major module of 30 in. or 40 in., etc. Such systems assist the architect and builder but may create practical difficulties for the lighting engineer and electrical contractor. Incorporating recessed lighting fittings into ceilings may be difficult, and may force the use of tube lengths chosen for modular convenience rather than for economics or suitability to the lighting task, as well as requiring expensive special fittings.

It would be a retrograde step if the extensive use of the 40 in. system forced the adoption of 36 in. tubes or 24 in. tubes in order to accommodate the fittings into the grid. The difficulties are not so great when the units are suspended below a 40 in. modular ceiling but, even then, the appearance will be untidy for the fitting lengths do not match the building grid lines and windows.

Common modular dimensions for overall ceilings are 12 in., 24 in. and 36 in. These dimensions are usually quite convenient for most illuminated ceiling systems now available and the fluorescent tubes may be of any convenient length since they are concealed by the translucent ceiling panels.

Where fittings are arranged on the ceiling in a grid pattern and demountable partitions added later, there may be some difficulty in obtaining a uniform level of illu-

mination in all areas. Obviously, the illumination in a large office containing 10 or 20 fittings will be higher than in a smaller office derived from enclosing an area containing only one or two fittings. This effect can be offset by utilising interchangeable single and twin tube fittings, which have the same size diffuser or louvre attachment, the twin tube version being used in the smaller areas. Alternatively, the installation may be made up by the use of 4 ft or 5 ft fittings which, under the conditions described, will not noticeably appear to be other than of uniform size and the differences in diffuser brightnesses should not cause comment.

Note must be taken of modern developments in the control of glare and the increasing use of fittings which have a spacing-to-mounting-height ratio of $1\frac{1}{4}:1$ or 1:1, as opposed to traditional open and diffusing fittings commonly used at a ratio of $1\frac{1}{2}:1$. Spacing ratio problems can sometimes be solved if the proposed desk layout is known, so that the lighting fittings can be positioned on a semi-localised basis.

The successful use of luminous ceilings for display lighting is encouraging their use in offices. Windows which reach right up to the ceiling line may cause difficulty, particularly if the cavity depth is restricted because the true ceiling height is low. Sometimes the luminous ceiling must be stopped short of the walls and careful detailing at the heads of the windows may be required. Further, because of the high thermal insulation of modern flooring, it may be necessary to provide forced ventilation of the ceiling cavity. With higher illumination levels, we may soon find ourselves in this country following the lead of the United States where many ventilating and lighting systems are physically integrated.

Starter-switch control gear, with its attendant maintenance and replacement problems, should be avoided. Where fittings are frequently switched, and particularly in conference rooms, interview rooms and other places where visitors may enter, there is much to be said for having a switchless start circuit which will give almost instantaneous striking of the tubes simultaneously. In fact, there is a growing tendency to standardise on switchless control gear regardless of application.

Economic Considerations

The initial cost of a lighting installation comprises the cost of the lighting fittings, lamps and electrical installation work. It is generally found that the installation cost is between half and two-thirds of the cost of good quality fluorescent fittings. However, these prime costs are only part of the total outgoings which will be expended during the life of the installation. The cost of electric current, cleaning, maintenance and lamp replacements may be a larger sum. Calculations of this type immediately demonstrate the economic advantage of fluorescent tubular lamps over tungsten filament lamps, the overall capital plus running cost of the latter being about three times that of the former. Efficient fittings which have good maintenance characteristics and which are easy to clean will, in the long run, easily justify the extra initial expense.

It would appear that a considerable saving in wiring costs could be made if lighting on stairways, hallways and toilets, etc., was controlled by group switching which

1. A modern treatment combining filament spotlights with recessed fluorescent lighting. The Chartered Bank, Lower Regent St
2. A fluorescent laylight has been chosen for the office area of Barclays Bank, Gracechurch St
3. At Nabisco Food Products, Welwyn, recessed fluorescent fittings provide comfortable illumination
4. Conventional but efficient. The drawing office, Ricardo Eng. Co., Shoreham (General Electric Co.)

might also minimise risk of falls, etc. Normally, these areas of office buildings are artificially illuminated during the whole of the hours of occupation and could logically be switched together from a central control. A time switch coupled with a solar cell to take care of unusual weather conditions, has successfully been employed for this purpose on a number of installations.

Comfort

The standard of human comfort in workplaces generally has risen to a remarkable extent in recent years so that, if loyalty, interest and continuity of service are to be expected of staff, they, in turn, expect to be provided with a working environment comparable with that offered by parallel organisations. The criteria will involve toilets and washrooms, cloakrooms, central heating, ventilation, acoustic control, canteen and other social facilities. Great importance is placed upon the provision of adequate working space, both in area and volume, and in many cases furniture is specially designed. Nevertheless, it seems that, however lavish the social benefits provided in an employment, the factors most appreciated by staff are rather intangible for it is true to say that female staff would sooner work in a room of pleasant appearance with a comfortable "atmosphere" even if other amenities are not of a high order. The amenity aspect of office lighting is of importance today and often results in the employment of illumination levels much greater than the minima required for functional purposes.

While attempting to satisfy the requirements of room appearance and illumination, the lighting engineer must also solve any attendant problems resulting from the employment of mechanisation. It would seem that some manufacturers of office machinery still cannot be persuaded to avoid the use of chromium-plated parts, often cunningly angled to direct glare into the user's eye! The lighting of a mechanised accountancy room, or even a typists' room, should receive the same careful attention as if it were the lighting of an area devoted to precision manufacture. Glare by reflection as well as from overbright fittings must be avoided.

Even before the publication of the 1961 IES Code, many office managements were using illumination levels far in excess of the 30 lumens/sq ft now advocated; further, a number of installations now exist where permanent supplementary artificial lighting is employed at illumination levels of 50 lumens/sq ft or more. It is recommended that, at these higher levels of illumination, a "cooler" tube is employed, such as "Daylight." On the other hand, "Warm White" or "Deluxe Warm White" tubes will be most satisfactory in reception areas and entrances, are recommended in areas solely occupied by female staff and for moderate illumination levels. The "White" tube is also eminently suitable for general lighting in offices on account of its high luminous efficiency.

A small point, but one much appreciated by female staff, is the provision of fluorescent lighting in the toilets with the same colour tubes as those used in the offices. This is of great assistance to the ladies when "making-up."

Although in a few cases it will need legislation, or at least strong propaganda measures, to make some employers conscious of the need for adequate lighting in their offices, it would appear that the majority of managements today are anxious to provide suitable amenities for their staff. The continuing shortage of good office staff encourages employers to provide the most pleasant environmental conditions they can afford. It certainly must be an assistance in maintaining happy staff relations to provide a light, cheerful office without shadows and discomfort glare. Furthermore, it has been universally noted that, as illumination levels are so improved, the standard of the "housekeeping" also rises, resulting in cleaner premises. Similarly, improvement of lighting results in improvement in morale and accuracy of work. One has to consider that, if the IES recommended illumination level of 30 lumens/sq ft during the whole day is to be maintained, most workers in existing office buildings with poor daylighting will be under artificial illumination for more than half their working hours. It will, therefore, be appreciated that the subject of good office lighting is of vital and ever-increasing importance to managements in the interests of efficiency.

B.L.C. OFFICE LIGHTING CAMPAIGN

LAST Monday saw the start of the Office Lighting Campaign, being organised by the British Lighting Council, with the opening of the display of office lighting over the past century at the London headquarters in Brettenham House and the first of a series of three conferences on lighting problems to be held this week. The display is of unusual interest in that it brings together a unique collection of early electric lamps in association with a selection of historical photographs full of nostalgic memories for those of us who admit to reaching middle-age. For the younger generation it is a vivid reminder of the achievements of their forebears.

Office lighting displays of a different character are planned in Birmingham (Friends' Institute, 31 October to 4 November); Sheffield (YEB headquarters, 23 October to 26 October); Leeds (BLC Office, 30 October to 2 November); and Hull (YEB headquarters, 6 November to 9 November); while the new Bristol Office of the Council is staging special displays beginning this week. In addition, exhibitions are being planned for Manchester, Liverpool and Scotland, the dates of which will be announced. Conferences, at which exhibitions will be a feature, are also being organised in Canterbury and Oxford. Demonstration installations at Sunderland, Manchester, Leicester, Brighton, Portsmouth and Nottingham have already been arranged and others are in course of negotiation.

Also coincident with the opening of the campaign is the issue of a new handbook, "Better Office Lighting," which is undoubtedly one of the best and most authoritative to be released by the Council. The price is 6s.

A view of the "100 years of lighting" display at Brettenham House

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Plug Tops?

ALTHOUGH the day—for which we have waited 20 years—when all socket-outlets and plugs shall be of one standard pattern and size, still seems to be almost as far off as ever, could we not have some measure of common agreement on nomenclature?

With the exception, I think, of one manufacturer, for many years now all well-known makers have listed their socket-outlets as sockets and the two- or three-pin objects which fit into them as plugs; a socket-outlet and switch combined is called a switch-socket (switched-socket would, perhaps, be better).

All of which seems to me perfectly reasonable and not calculated to cause confusion. Even many of the contractors now call them by these names, and I am rather surprised to read in your 19 October issue, Mr R. F. Still in every case refers to the plugs as "plug tops." This has, in my submission, always been a misnomer, although 30 or so years ago, it was common practice.

Even now, when plugs are listed as plugs, I am often asked by the wholesaler if I want "plug tops" when I ask for plugs only.

In the same issue *Megohm* is I feel, "preaching to the converted" over electrical risks. What is wanted is more articles on this line in the non-technical Press, but how difficult it is to get a reasonable article accepted, unless it is well garnished with such phrases as "Death lurks at the switch," or "Keep well away from the innocent baby fingers," etc., *ad nauseam*.

Richard St. C. Ison,
CHELTENHAM.

Off-peak Heating Design

MY apologies to Mr Tibbs for misinterpreting his practice of adding the floor loss as a separate item, where he presumably includes both upward and *downward* losses. Since reading his second letter, I have become aware of his particular problem, and which should have been fully explained by his tame heating engineer.

The assertions are correct as far as they go, with the exception of his interpretation of "conventional temperatures" when referring to walls, etc., and at this point some explanation of basic principles, often overlooked, is needed.

Heat is lost from a human body by conduction, convection and by radiation, although unless the body is lying on a stone floor, or on a mable slab, loss by conduction can be conveniently ignored.

Loss by convection can be considerable, particularly if the surrounding air is subject to draughts, and is of high relative humidity, but by far the most important heat loss factor is that by radiation from the body to colder surfaces, such as walls *and floors*, and if the temperature of these surfaces is raised, the air temperature can be reduced to produce the same degree of comfort. By warming the floor (the walls also by conduction), to approximately 75°F to 80°F, the radiant heat lost from the body becomes practically zero, because the normal surface temperature of clothing is between 73°F to 75°F.

Having removed most of the radiant loss, the only other loss is by convection, which is, as I have stated before, dependent upon air temperature, air movement, humidity, etc.

With all these variable factors considered, the result can be fairly described as an equivalent temperature, and the equivalent temperature which is found most satisfactory in this country, is approximately 65°F. The following table (with acknowledgments), sets out the corresponding air temperature against the mean radiant temperature to achieve this figure.

Air Temperature.
Degrees F. 40, 45, 50, 55, 60, 65, 70, 75, 80, 85.
Mean Radiant Temperature.
Degrees F. 92, 87, 81, 76, 70, 65, 59, 54, 48, 43.

By conventional heating methods, the air temperature must obviously have to be raised to between 65°F and 68°F, as admitted, to raise the surface temperature of the surrounding room to that temperature, in order to minimise the radiant loss component. With floor heating, the floor and wall temperature does that, whilst the enclosed air is almost fortuitously heated at the same time.

This last fact is one reason why the heat losses are lower than by conventional methods—the second is that air temperatures can be several degrees lower as well, without detracting from full comfort conditions.

M. C. Woodward,
CWMBRAN, MON.

Rewiring Flats

MR J. D. PARKER'S letter (19 October) intrigues me, particularly when he states that a conduit system costs approximately 17% higher than a pre-assembled m.i.c.c. system.

We have had considerable experience in this type of work, and up to the present (save in very exceptional circumstances) we have found the conduit installation, taking all things into consideration, to be cheaper than m.i.c.c. and far less vulnerable to damage.

If a conduit system is properly installed, and wiring is carried out after plastering is completed, then it can be rewired at any time, unless something drastic has happened during its working life.

My remarks naturally apply to new construction.

L. A. Evans,
WESTON-SUPER-MARE.

Thermo-electric Advance

DEVELOPMENT of a high-mechanical-strength, low-electrical-resistance bond between semiconductor thermo-electric elements and the conducting plates to which they are attached has been claimed by the General Atomic Division of the US General Dynamics Corporation. J. B. Roes, leader of the company's thermo-electric group, claimed in Vienna last week that this had permitted miniaturisation of thermo-electric generators. The miniature elements are about 2½ cu mm in size and weigh only 20 mg for an output of 1A at 50 mV. It is claimed that a series of elements weighing 1 kilogramme would produce an output of 1 kW.

The company are reported to be working on a 5 W thermo-electric unit for building into an electricity supply unit for use in gas-burning households in America. The work has been undertaken for the American Gas Association.

Power engineering review

CHAIRMEN'S ADDRESSES TO I.E.E. LOCAL CENTRES

EACH October, the chairmen of the local centres of the IEE deliver their inaugural addresses. The wealth of engineering experience they represent seldom fails to provide plentiful food for thought on the future development of electrical engineering. This year is no exception in this respect. This week, we summarise some of the addresses. Others are to be dealt with in a later issue.

Sub-area Development

In his address to the Mersey and North Wales centre, Mr R. N. Pegg spoke from his experience as MANWEB No. 4 sub-area manager. He devoted his address to tracing the accomplishments of the sub-area team since vesting day, when it took over an area of 3,980 sq miles served at the time by 29 authorised undertakings and 60 non-statutory undertakings. The sub-area inherited 57 different tariffs and 150 different unit rates applied in about half of Cheshire, part of Shropshire and the counties of Flint, Denbigh, Caernarvon, Anglesey, Merioneth, Montgomery and part of Cardigan.

At vesting day, the sub-area 11 kV network supplied 165,281 consumers, of whom 7,712 were on d.c. In the south western part of the area, the primary network was not integrated with the main network. Overall maximum demand was 116 MW. By 1961 the existing 20 kV network has been uprated to 33 kV and from the 57 20 kV and 33 kV substations then existing, the system has expanded to 95 substations all of 33 kV, with a plant capacity of 612 MVA. Forty-one of the original 57 substations have been completely reconstructed. Grid supply points, originally two, are now 11. Mr Pegg comments that the sub-area staff have long passed the point at which they had installed more than they took over.

The commercial staff of the sub-area, which inherited 24 service centres, now operate 36, and have to deal with over 273,000 consumers compared with 153,000 at vesting day. One of the biggest jobs in the early stages was standardisation of consumers' records and evaluation of premises for tariff purposes. The commercial department operates an advisory service for all types of consumers, a feature particularly appreciated by the small commercial and industrial consumers, whose business does not warrant the employment of an electrical engineer on their staff.

Discussing secretarial and administration sections of the board's staff, Mr Pegg comments that they have one important productive function, obtaining wayleaves and consents, and arranging for leases and purchases of real estate for buildings. Since vesting day the sub-area staff have obtained 61,461 wayleave agreements, and 841 sub-station sites. They also have to deal with claims from landowners for alleged damage following construction work—so they have to be informed on the value of a farmer's crops as well as of any timber that may be involved.

The accounts section of the sub-area is directly concerned with the consumer in terms of meter reading and collecting money. Overall meter readers' output has increased by 35% since vesting day. In rural areas, new cyclometer dial meters are installed and for three quarters of the year the consumer is sent a franked postcard for self-recording. Only the fourth quarter's reading is taken by the meter reader. Co-operation of consumers in this respect has been good.

Included in the accounts department is a costs section providing information for management. One of its functions is production of a "cost comparison statement." For each job actual costs are shown against the estimated expenditure which has been authorised. Differences greater than $\pm 5\%$ have to be explained by the responsible engineer. Figures from the cost comparison statement are used for the periodic revision of engineering estimating schedules.

The sub-area is extensively concerned with rural electrification. This is based on 11 kV three-phase primary network for each county with single-phase spurs. An order of priority has been established for sections of counties which are completed as an engineering scheme. Standard connection fees are charged on the basis of single-phase services.

Large Generator Design

Developments in the design of large generators are reviewed by Mr P. Richardson (C. A. Parsons) in the address he delivered to the North East centre. He paid particular attention to the way failures had influenced design progress, although emphasising that the total number of failures has been relatively small.

In the post-war period, there has been failure of end bells and rotor forgings. So far as end bells are concerned, two failures in Canada in 1954 had a marked influence. Up to that date, practice was to produce by hot working of the steel used, a ring smaller in diameter and greater in thickness than the finished ring. This was cold-expanded to the finished size after heat treatment by squeezing the forging between a mandrel and the top die of a forging press. More recently, the bell has been water-quenched after the heat treatment, then reheated to the cold working temperature. Also, the method of forging has been changed to cold expanding, i.e., pushing a tapered mandrel through a hole. By these changes more uniform distribution of residual stress has been obtained.

Changes regarding rotor forgings have stemmed from three serious rotor failures in America in the period 1954-56. Prolonged investigation of the failures directed attention first to the high notch impact transition temperature of the steels, and secondly to the presence of too many hair-line cracks or large non-metallic inclusions in the forgings. Subsequent tests showed that the rotational speed required to fracture an unnotched turbine disc was not affected by the temperature at which bursting took place, but that with a notched disc there was a definite falling off in strength below the transition tem-

perature. Above the notch impact transition temperature, notched and unnotched discs had almost equal strength.

The advoidance of this trouble lies in lowering the transition temperature by appropriate heat treatment, and in avoiding stress-raisers, notably hair-line cracks. These are due to the presence of hydrogen in the steel. In the UK, the use of a proper amount of scrap in steel-making keeps the amount of hydrogen down and lengthy heat treatment causes it to diffuse out. An alternative method developed in Germany is to cast the steel from the furnace in vacuum. This method is likely to come increasingly into use in the UK.

Insulation failure in generators is often affected, in Mr Richardson's opinion, by vibration. Micanite does not seem to be attacked by corona, but the vibration shows as a fretting of the Micanite surface similar in appearance to the damage corona attack produces.

Another cause of insulation failure is tape migration, arising from differential expansion of the copper conductors and the surrounding iron. Magnetic vibration is a contributory effect here, Mr Richardson believes. When the machine is hot, vibration aids relative movement. When it cools, there is no vibration to help the tape regain its original position.

Negative phase sequence currents which flow because unbalanced faults are imposed on generators produce a double frequency flux in the generator rotor and cause heating at the junction of the rotor body and the end bell. Local temperatures as high as 400°C have been reached. In most cases so far, faults have been detected because of smoke emerging from the generator end shields. Mr Richardson confesses to being worried about what may happen when such faults occur with hydrogen-cooled generators, where the generator gas circuit is efficiently sealed.

The worst difficulty arises with a line fault of insufficient magnitude to operate the line over-current protection, but sufficient to damage the generator. Mr Richardson thinks that the proper place to apply negative phase sequence protection may be at the feeder rather than the machine.

Direct cooling of rotor and stator conductors has increased the output/unit weight of generators, but it has brought other advantages as well. For example, difficulties about thermal expansion become negligible with water cooling. However, the real advantage of liquid cooling lies in the smaller stator slot. This becomes relatively shallow and, since the stator core diameter can be reduced in proportion, there is an appreciable saving in weight. Also, the shallow slot leads to lower natural reactance, a valuable feature from the aspect of system stability.

It is worth noting that, as a result of such developments, a 500 MW generator with 22 kV output has an excitation current of about 4,500 A, and a 3·5 MW rated exciter. Collection of such large currents at slip-rings poses a problem, particularly that of current sharing. Mr Richardson reports investigations which have shown that when one brush of a set operating on a slip-ring ceases to conduct it is because it takes up a stable position in which an air wedge separates and electrically insulates it from the ring. The interface distance is of the order of 100 microns.

In a good conducting brush, the air wedge has collapsed or is less than 20 microns thick. In the latter case, the current is carried by small grains of carbon which roll between the surface of the ring and the brush.

A final point made by Mr Richardson concerns shafts for large units. Assuming a.c. exciters working in conjunction with semiconductor rectifiers, he reports that interposing the exciter between the turbine and generator increases resilience and reduces shaft stress caused by oscillatory short-circuit forces.

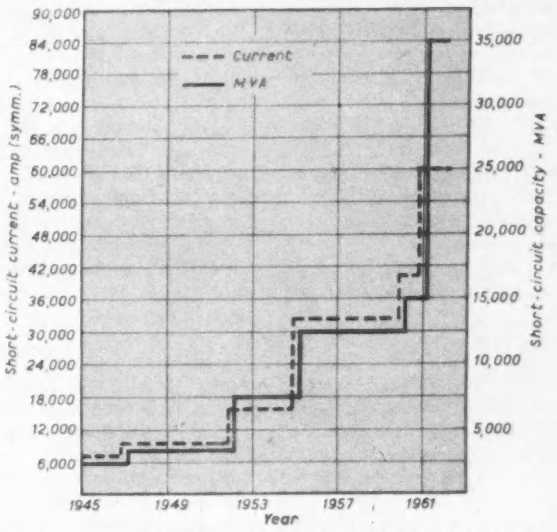


Fig. 1. Increase of rated breaking capacity of British 132/400 kV circuit-breakers (from the address by Mr Flurscheim)

Equipment Progress

Progress in generation and transmission equipment design is discussed by Mr C. H. Flurscheim (AEI) in his address to the North Western centre. Regarding large steam sets, he comments on the fact that they are being designed for quick stopping and starting. A corollary, he suggests, is that the economic need for gas-turbine peak-load stations has receded in this country, and the rate of development of large gas-turbines is lower than at one time expected.

The present limitation on size seems to be imposed by transport difficulties. The limit for transport of the completed stator with integral cooler housings is 120 MW. The next stage is to construct the hydrogen cooler housings in separate units and, after that, to make the stator housing as a separate shell and mount the stator core and windings on a separate removable inner frame.

For the future, one of the limitations comes in the rotor coil binding ring, already stressed at overspeed to 66% of the elastic limit of the best available materials. Better materials such as titanium are likely to be necessary for this. A change to water cooling of rotors may be necessary as unit sizes increase.

Mr Flurscheim reviews unconventional methods of generation now under investigation, such as MHD generation, controlled fusion and the fuel cell. He then passes on to consider transmission.

Advance in the technique of reactive power compensation on a.c. transmission systems has continually raised the economic transition voltage at which a change to d.c. transmission becomes worth while. It may now be of the order of several thousand MW transmitted for several thousand miles—conditions unlikely to arise, Mr Flurscheim thinks, except in the USSR.

In transformers, the biggest changes have been brought about by the introduction of cold-rolled, grain-oriented steel and through the development of high-speed resistor on-load tap-changing equipment. Sizes of transformers have grown, so that transportation has become a limitation. Partial assembly on site cannot be overlooked as a possibility for future development.

Switchgear has been developed to meet a "phenomenal" increase in short-circuit ratings. Both oil and air c.b's have been developed, but the o.c.b. in multi-break form may

not extend far beyond 330 kV, 15,000 MVA, partly on account of difficulties in proving performance and partly because of transport considerations. At present, both types of c.b. offer total break times as low as two cycles to four cycles.

Air blast design has moved towards internal isolation. Improvements in performance that are "very marked" have followed from improved techniques for scavenging ionised gases in the region of the arc gap. Further increase in rating may require higher air pressures or the use of electro-negative gases such as sulphur hexafluoride. The vacuum switch may enable a major break-through in performance to be achieved.

The District Representative

Speaking to the Western centre, Mr T. Gill (AEI) considered electrical engineering as seen from the aspect of the district representative of a large manufacturer. The district representative, he said, had to be aware of the requirements of the user and form the link between his client and his principals in both technical and commercial matters. Mr Gill listed the desirable qualities of the representative as including the ability to understand the user's requirements, to talk to him in his own language, and possession of adequate engineering experience and technical knowledge to assess the problem in hand.

Many of the difficulties that arise between manufacturer and customer may be minimised, in Mr Gill's opinion, by the user taking the manufacturer fully into his confidence at all stages of the contract, and by his making the fullest possible use of the facilities and service afforded by the manufacturer's district office.

Applications of electricity in a wide range of heavy industry are discussed in the paper. In the space available it is possible only to mention some of the points made. On mine winders, for example, Mr Gill traces the early history to the present system of automatic winding and use of high-accuracy, variable-speed control systems. Closed loop systems of control, although expensive, have produced excellent results as long as load and time cycles have conformed to a consistent pattern. However, this is not always possible, as a winder may be required to raise or lower any load from zero to a maximum over a range of speeds. These requirements and the complex decking sequences often required are most satisfactorily made by a d.c. motor with Ward Leonard control. Accuracies of between ½% and 1% are easily obtainable, and it is doubtful if a better performance than this would be worth while.

So far as speed control generally is concerned, the picture is changing rapidly with the growing availability of small semiconductor rectifiers. Even in a new factory having a preponderance of d.c. drives for variable-speed purposes, the use of a.c. distribution and d.c. motor supply through semiconductor rectifiers may before long prove more economical than a central converting plant and a d.c. network.

Heavy drives cause concern to supply authorities because of voltage variations which may be quite intolerable if they form a regular and continuous pattern. Unfortunately, mine winders and reversing mills are cyclic in operation and fall into this category. Starting requires maximum torque at minimum voltage and in some circumstances the result may be a demand for up to three times full load current at a power factor initially as low as 0·1 although rising to 0·85 as the voltage builds up. The percentage of voltage variation is about equal to the actual MVA reactive swing expressed as a percentage of the short-circuit MVA at the point of common coupling.

Electric arc melting furnaces give rise to the same problem. Any solution in such cases is sure to increase appreciably the cost of installation.

Noting the growing use of automatic systems, Mr Gill remarks that the advantage to be gained from them will be nullified if their high initial cost is not offset by reduced maintenance charges of if they are not accompanied by maximum availability. The control gear presents the greatest problem here, so increasing interest is being shown in methods of static control. The problem arises with contact-less devices to replace push-buttons and limit switches, that they do not physically break the circuit they switch off. In other words, isolation is not achieved. Component breakdown must be anticipated at some time, and it is more difficult in the case of a static unit than a contactor to predict where the failure will be; to the "on" position or the "off" position. Failure to safety is therefore less easily achieved. None the less, a number of small installations have been successfully made which have amply fulfilled the promise of negligible maintenance.

Planning for Supply

Complexities of planning in electricity supply are considered in the address which Mr W. Szwander (Belfast Corporation Electricity Department) delivered to the Northern Ireland centre. He looks behind the rule-of-thumb doubling of demand every ten years, to see what is involved for engineers who must provide plant and facilities in good time.

A basic point which Mr Szwander makes is that presentation of long-term planning on a scale of time is of secondary importance only. It is sufficient, and more reliable, to relate a long-term programme to some magnitude representing growing demands. Short-term (construction) programmes are the place to write in a time scale.

This suggests that the final result of planning work should consist of a long-term general development plan, outlining the main principles and trends of envisaged progress; and a short-term programme of immediate implementation. The latter will be sufficiently detailed to lead to programmes for action in the fields of finance, construction and commissioning. The long-term plan, to be of value, must remain under constant review, although if it has been soundly conceived, drastic alterations are unlikely.

Technical considerations will pervade the plan. On the generating side, for example, there is the thought that an installation cost reduction of about 20% has been achieved by doubling the unit size of plant. However, the supply system planner must look at system-wide costs, not those of individual plants alone. This may involve using special types of plant, such as gas turbine or pumped storage installations.

In transmission planning, it seems advisable to err on the high side so far as selection of voltage levels is concerned. Further, the ratio of consecutive voltages should be high. Fault levels must be watched from the long-term aspect, so that replacement of switchgear, always an expensive business, does not become necessary.

Distribution development is greatly hampered by the difficulty of finding substation sites. Mr Szwander suggests that the present legal basis for this is far from satisfactory. He considers it particularly unfortunate that some prospective consumers and others responsible for erection of new premises do not fully appreciate the needs of electricity supply.

To avoid the need for too many substations (e.g., 33/6·6 kV substations spaced less than ½ mile apart), Mr Szwander suggests that a likely solution will be omission of certain lower voltage steps in the distribution scheme, and the occasional use of three-winding transformers feeding in parallel networks of different voltages.

Matching heating to tomorrow's weather

NEW E.R.A. FLOOR-HEATING WORK

IF energy input to thermal storage systems can be matched more closely than at present to the next day's heat requirements as determined by the weather, there will be advantages for the building occupiers and possibly for the supply industry. That thinking is behind a new Electricity Council sponsored project, which seeks to provide central control of switching on and off floor storage systems. The times of switching will be determined by Meteorological Office forecasts of the next day's weather.

Test Building

An essential prerequisite for success of such a scheme is a known relationship between weather conditions and the thermal behaviour of a heated building. A major investigation is being launched by the Electrical Research Association to improve knowledge in this respect. Under the direction of Miss M. V. Griffith, head of the heating section at the ERA's Leatherhead laboratories, the new work takes the form of extensive measurements on the behaviour of a specially designed five-floor building simulating a block of flats.

A five-storey building has been chosen so that test results can be obtained for three types of building cladding, with top and bottom storeys acting as "bolsters" to take out certain disturbing influences—ground and roof losses. The three types of cladding being tested are lightweight concrete blocks (Siporex), cavity brick and glass walling. The top and bottom storeys are built with cavity bricks.

Each of the "rooms" is 8 ft from floor to ceiling, 12 ft square. It has a 6 in. thick r.c. floor slab covered by a 2 in. heat insulating layer of resin-bonded fibreglass and a 3 in. concrete screed. Each is provided with a window and a refrigerator-type door. Of intent, no heat insulation is provided beneath the ground-floor screed, and the concrete slab rests directly on a layer of hardcore.

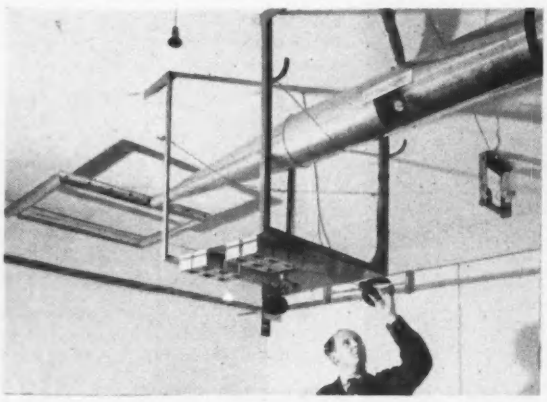


Fig. 1. All heating research involves extensive instrumentation. These instruments are used in test huts comparing off-peak and continuous heating energy-input requirements

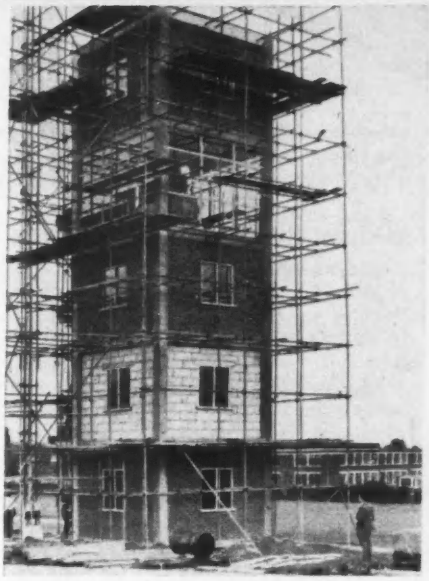


Fig. 2. The new five-storey test building is nearing completion

Experiments

In the initial experiments, expected to last for two years, the rooms will be operated to keep constant temperature day and night, initially, at least, without any restriction on time of heating. The variable will be the electrical input, and this will be related to the weather conditions. At the same time, extensive instrumentation will provide information on room temperature and on heat flow through the floors. So far as possible, the rooms will not be entered during this period.

The investigation is not concerned with temperature alone. It is becoming realised that heat requirements are affected by many other characteristics of weather. To instance just two, cloud cover and rain have to be considered. If there are clear skies, then at night the radiation from a building into the sky will effect a major cooling influence. It may, indeed, exceed the effect of solar gain from a preceding sunny day. Cloud cover, on the other hand, provides a blanket protecting against the excessive radiation into space. Rain may affect the thermal characteristics of brickwork. Again, time-lags will be of interest as well as the magnitudes.

It is hoped that detailed analysis of the results obtained will give a measure of all the effects associated with weather. Clearly, analysis will be a major task, and it is being made the subject of special arrangements. When the relationships are established on steady state, then an attempt will be made to introduce and measure humanly introduced variables, such as the effects of opening and shutting doors, intermittent heating and the effects of lighting. This will give a measure of the comparative magnitudes of the effects produced by these variables and by weather changes.

Centralised Control

The information obtained will be useful in many ways, but particularly in connection with the centralised switching project. The idea here is that weather forecasters can indicate the next day's probable conditions, and will know the previous day's. Given the results hoped for from the ERA experiments, this will permit the heat input requirements to be predicted and allow the most economical heat charging period for a floor-heated building to be determined. Arrangements are being developed for a coded signal based on this timing to be transmitted over GPO telephone lines to the buildings affected. The arrangement would be practicable only when large installations are controlled from one point, as in blocks of offices or flats.

Preliminary work is starting, apart from the ERA

experiment, through using local weather forecasts to adjust the time of switching of two floor-warming installations. This is being done directly, not over GPO lines.

Heating Research

The five-storey test building is the major laboratory experiment of the ERA heating section at present, but there is much work on hand through instrumentation of blocks of flats and the like which have floor-heating installed. Particularly notable is a London County Council block, in which the top four storeys of two blocks are being built and instrumented to check how ERA recommendations about thermal insulation and about auxiliary heating work under actual conditions of occupancy. Some of the flats in each case are heat insulated and others are not. Electricity for heating is being supplied at a fixed heating season charge during the experiment, and on one floor the ERA have even provided carpets to give full control over the thermal insulation.

In the controlled conditions test room at the Leatherhead laboratory, tests are about to begin on a modification of the simple floor-heating installation which may have important promise for domestic heating. It is based on the idea of insulating above as well as below the floor slab, and providing ducts to carry air through the slab, with an arrangement for controlling the air flow. By this means, the output of heat from the floor is more under control than in the simple installation. Typically, the ducts might be kept shut during most of the day, but opened up fully during the evening when maximum heat in the home is likely to be required.

Capacitors for Transformer Testing

IT is now some little time since the 67·2 MVAr capacitor bank for testing transformers, designed, manufactured and installed by British Insulated Callender's Cables Ltd. for Ferranti at their Hollinwood works, was brought into service. In the interim it has been used, among other duties, for the testing of large transformers made for American markets.

The use of a capacitor for transformer testing is about the quickest and most economical means of providing a large test supply and, in the present case, an existing 60 c/s synchronous condenser was available for use as an alternator. Since 60 c/s is the standard frequency for American systems, this enables tests to be carried out at the designed frequency without the enormous capital expense of a large frequency changer; moreover, it permits a test load to be applied up to 70 MVA without exceeding a demand of 8 MVA from the NWEB system.

The Capacitor Bank

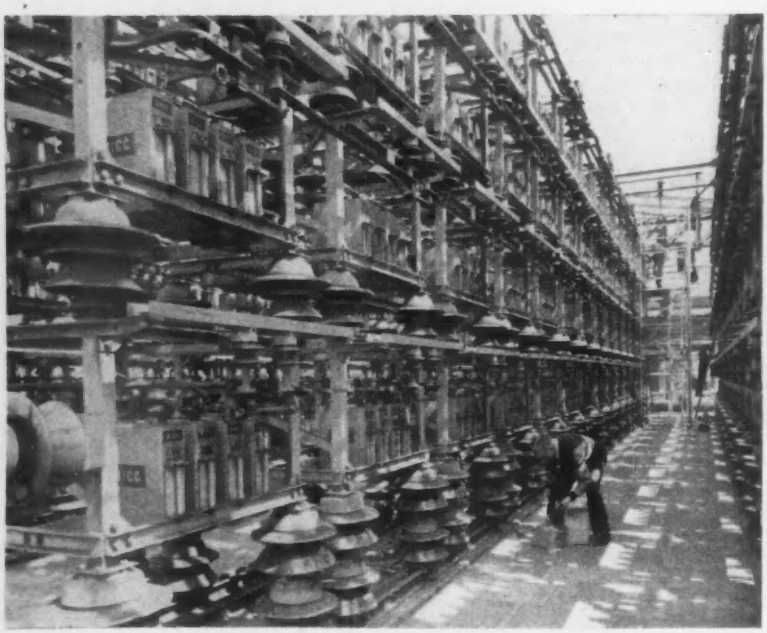
The bank comprises two 33·6 MVAr sections which are electrically identical and, when connected in parallel, the total available output at 60 c/s is 67·2 MVAr. In all, there are 2,688 units in 336 racks and they are connected to the transformer test area by twin overhead aluminium conductors which are said to be the largest in the country. Incoming busbars are rated to carry 3,000 A continuously. A new 15 MVA test transformer is connected to the bank and the arrangement of the units is such as to permit extreme flexibility of application in terms of voltage and kVAr settings, a suitable bank for a specified test being set up in about 15 min. Once set up, no change is necessary for alternative tests which are sometimes required.

Isolation and Protection

The capacitor bank is, of course, erected out of doors and can be energised both from the new transformer or an older unit in the adjacent transformer production building. A gantry in the building provides the terminations and supports the two-way and off isolating switches which are used to connect the transformer and capacitor bank to the unit under test and also to short-circuit and earth the bank terminals after isolation from the supply and on completion of a test. For those tests requiring star connections with the neutral point floating, an additional isolating switch is provided and standard procedure is for personnel, on entering the enclosure after a test, to first close all isolating switches, using an insulated pole, thereby ensuring that the individual banks are short-circuited while setting up for a subsequent test.

On the whole, the testing equipment is considered to be the largest and most flexible industrial installation of power capacitors in the UK and it is possible that it may even be the largest in Europe. It will be of particular value in connection with the 400 MVA 380/275 kV 3-phase autotransformer ordered by the CEGB.

The attached photograph gives some idea of the installation as viewed by personnel when inside the compound.



A view along the stacks of 25 kVAr BICC capacitor units in the 67·2 MVAr test bank at the Ferranti works, Hollinwood

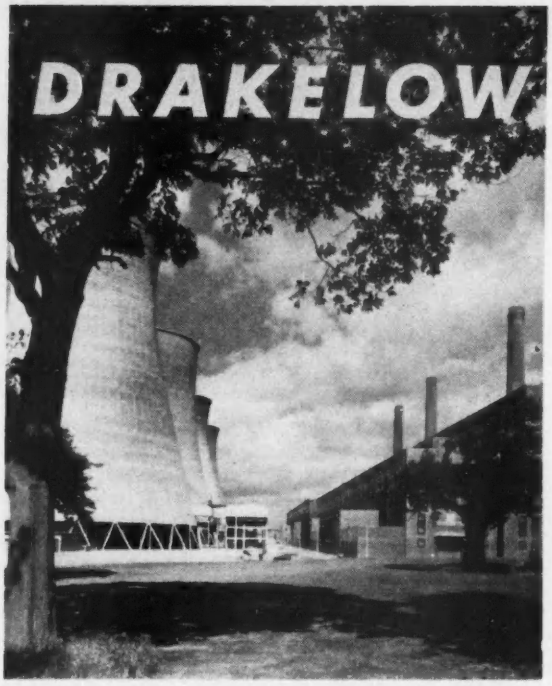


Fig. 1. General view of Drakelow "A" and "B" stations and cooling towers, with station "A" in the foreground

Four 120MW sets in Drakelow "B" mark it a transitional stage from the 60 MW set "A" station to the 350 MW and 375 MW supercritical "C" station

GENERATING capacity exceeding 2,000 MW will be available when the third stage of the Drakelow generating station is completed. Completion of an intermediate stage in development of the site was celebrated last Friday with the official opening of the "B" station by Sir Ian Walker-Okeover, BT., D.S.O., T.D., Lord Lieutenant of the County of Derby.

The Drakelow stations, in common with several other stations in the Midlands, are sited on the banks of the River Trent within short distances of the South Derbyshire, Leicester and Nottingham coalfields. The station has recently been included in the West Midlands Division of the CEGB.

Drakelow "B" has four 120 MW turbo-alternators manufactured by C. A. Parsons. The first set, with its associated boiler, was commissioned in April, 1959, and the last set in December last year. The boiler contracts, however, were split between two manufacturers: No. 5 boiler is by International Combustion, while No. 6, No. 7 and No. 8 have been built by Foster Wheeler.

Station Construction

A construction similar to that used for the "A" station (ELECTRICAL TIMES, 27 October, 1955, page 623), has been adopted for the "B" station. The two stations are built in line, separated by their common administrative block which also houses the main electrical control room. The main and ancillary buildings are of brick panelled construction, the boiler-house being steel-framed and the turbine-house framed with reinforced concrete. The building volume is 35·2 cu ft/kW. Like the "A" station, the "B" station has two brick chimneys 400 ft high and two ferro-concrete cooling towers, each 307 ft high and with throat diameters of 132 ft. These towers are used in common with the "A" station and provision for a fifth tower can be made if necessary in the future.

Coal and Ash Plant

The station is designed to burn slack, with a small percentage of slurry, having a calorific value between 7,800 B.Th.U./lb and 11,500 B.Th.U./lb. In accordance with CEGB policy, all coal is delivered to site by rail, at an average rate of 5,600 tons/day. Three side discharge tipplers unload the coal, which can then be taken either directly to the boiler bunkers by 1,000 ton/hr belt conveyors or to the 540,000 ton capacity store area where it can be spread by mobile equipment.

Two marshalling yards are provided for full and empty wagons, shunting being carried out by two diesel engines.

Ash content of the coal being burnt at Drakelow has now risen to an average of 20%, necessitating a modified system of ash disposal, including larger pumps, to that originally planned.

Ash and clinker from the furnaces collect in dry ash hoppers beneath each boiler. They are disintegrated, ejected by water nozzles and conveyed by other water nozzles through removable nickel cast-iron sluices to the ash sump by three 50% duty pumps, driven by 230 h.p., 3·3 kV motors, with capacities of 1,900 gal/min at 260 ft head.

Fines are removed from the flue by twin, 70% efficient, centrifugal collectors and 97% efficient electrostatic

Fig. 2. Unit control room for Nos. 5 and 6 boiler/turbines. Access to the controls inside the desks is by an underfloor walkway. Television tubes for furnace flame monitoring are visible on the control panel just above the desk at which the operator is seated

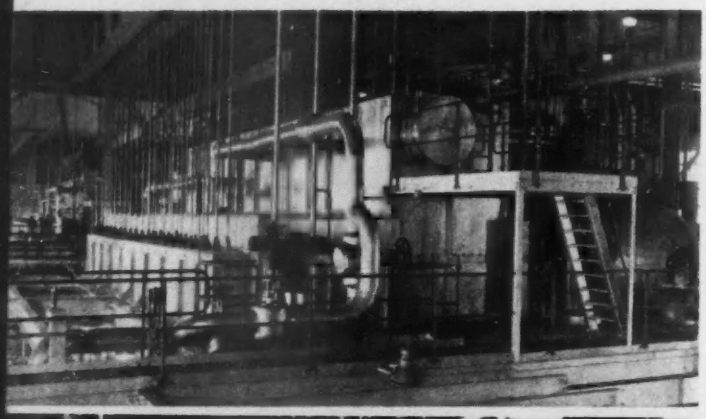
precipitators. Efficiencies for the precipitators on No. 6, No. 7 and No. 8 boilers are slightly lower than those quoted for No. 5 above. Fines are collected in storage hoppers and removed by hydraulic ejectors in the form of a slurry. The two dust slurry pumps are driven by 110 h.p., 735 r.p.m., 415 V motors.

Three lagoons formed in disused gravel pits are used for ash disposal. The lagoons are operated so that when one lagoon is being filled another is draining and the contents of the third, already drained, are being disposed of for road making and other applications.

Boiler Plant

The four single-drum, reheat boilers are designed for an evaporative capacity of 860 klb/hr with feed temperature at the economiser inlet of 435°F. They are of the radiant type with primary convection superheater and secondary superheater with radiant platens in the first pass and a convection surface in the final stage. The reheaters are two-stage, self-draining convection type, economisers are of the gilled tube type, and air heaters, two/boiler, of the rotary regenerative type.

On No. 5 boiler, the primary superheater is in two stages and is self-draining, whilst the secondary superheater, also self-draining, is of the pendant type. The convection reheater is self-draining and has two stages.



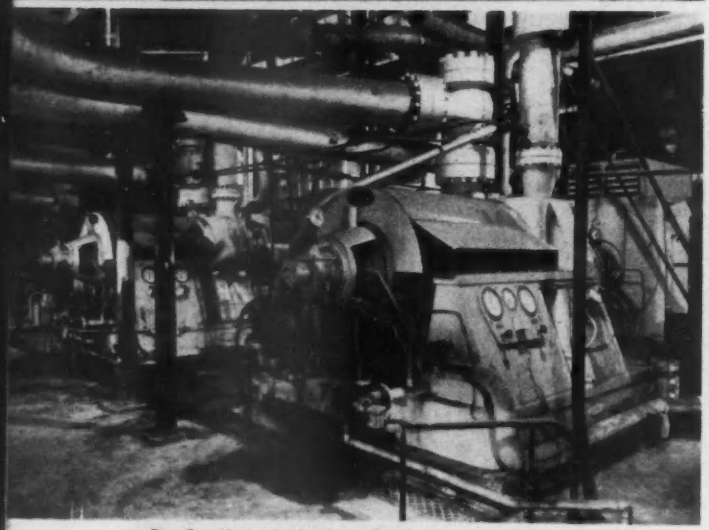


Fig. 3. Above, boiler drum for the No. 6 boiler. The four boilers are rated for 860 klb/hr at 1,600 lb/sq in., 1,010°F, with reheat to 400 lb/sq in., 1,005°F

Fig. 4. Below, one of the two eight-stage, centrifugal feed pumps for No. 6 boiler. These pumps are driven by 2,700 h.p., 3·3 kV squirrel-cage induction motors

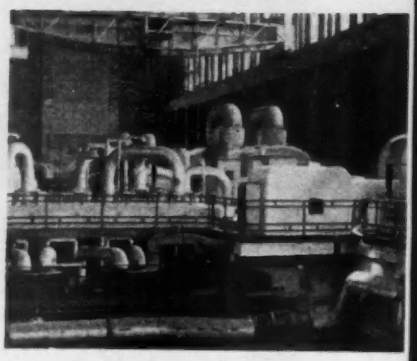


Fig. 5. No. 7 turbo-alternator. The three-cylinder impulse-reaction turbine drives the hydrogen-cooled alternator rated 120 MW at 0·9 p.f. 13·8 kV. The main and pilot exciters are gear-driven from the alternator at 750 r.p.m.

Superheat temperature is controlled on No. 5 boiler by an interstage, spray desuperheater, while reheat is controlled by tilting burners, linked for automatic control and with hand-operated by-pass dampers for coarse control. Spray desuperheaters are also fitted in the reheater inlet pipework for emergency use.

The temperature at superheater and reheater gas inlets can be varied manually under abnormal conditions by gas recirculation fans.

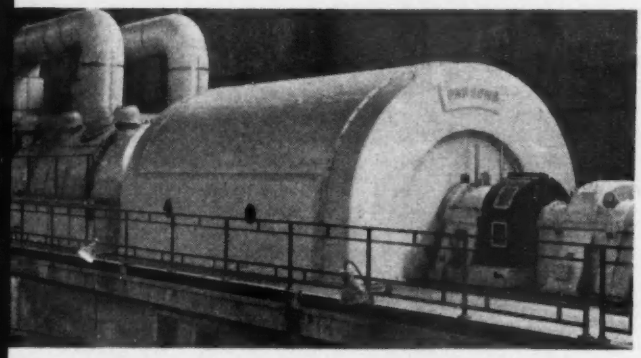
Boilers No. 6, No. 7 and No. 8 also have primary and secondary convection superheaters in the first pass and, in addition, they have radiant primary superheaters. On these boilers, main control of superheat is effected by a condenser between the drum and the radiant superheaters. By-pass dampers are used to control automatically the reheater steam outlet temperature, with provision for emergency use of spray desuperheaters in the reheater inlet pipework.

Plant Details

UNITS	No. 5	Nos. 6, 7, 8
STEAM-RAISING PLANT:		
Superheater outlet pressure lb/sq in	1,600	
Superheater outlet temp. °F	1,010	
Reheater inlet pressure lb/sq in.	425	
Reheater temp. °F	1,005	
Feed-water temp. °F	435	
Steam flow from superheater klb/hr at turbine c.m.r.	805	
Steam flow from reheater klb/hr at turbine c.m.r.	744	
Average calorific value of fuel B.Th.U./lb	9,175	
Average ash content	16%	
Volume of combustion chambers cu ft	82,100	82,000
Material of secondary superheater tubes	11¼% Cr. ½% Mo. 2¼% Cr. 1% Mo.	18% Cr. 8% Ni.
Material of reheater first stage	1% Cr. ½% Mo.	18% Cr. 8% Ni.
Economiser heating surface sq ft	126,298	95,040
Heating surface of each air preheater sq ft	126,000	115,400
COMBUSTION EQUIPMENT:		
Number of mills/unit	Five	Three
Capacity/mill lb/hr	31,100	58,900
Mill motors b.h.p./r.p.m.	220/1,485	600/369
Exhauster motors h.p.	240/70	120
Number and type pulverised fuel burners	20 Tilting type	18 Intervane type
Capacity/burner lb/hr	7,800	9,820
Number and type of oil burners	12 retractable	18 retractable
Max. steam flow on oil fuel klb/hr	80	30
Number of F.D. fans/unit	Two	Two
F.D. fan motors h.p.	496	408
Number of I.D. fans/unit	Two	Two
I.D. fan motors h.p.: r.p.m.	1,265/720:985/740	762/477: 740/590

Transformers

No.	Type	MVA	Voltage	Tap range and steps
4	Generator	125	13·8/295 kV	± 10% in 1.11%
4	Unit	10	13·8/3·45 kV	± 7½% in 2½%
4	Station	10	132/3·45 kV	± 10% in 1.43%
11	Auxiliary	1	3·3/433 V	± 5% in 2½%



Response to a change in superheater requirements takes about three times as long on the condenser type as on the spray type but, on the other hand, probably subjects the superheater metalwork to less severe thermal shocks.

Fuel is supplied to No. 5 boiler by five suction-type roller mills, four being sufficient for full load requirements. The p.f. burners are of the tilting type located at the corners of the furnace. Three oil burners for start-up are also located in each corner.

Boilers No. 6, No. 7 and No. 8 full-load requirements are met by two double-ended ball mills for each boiler, with a third mill as standby. The furnaces are designed for front-wall firing, using intervane burners with oil burners at their centre.

The oil burners on all furnaces are retractable and, while on Nos. 6, 7 and 8 boilers their capacity is only sufficient to meet light running requirements, on No. 5 unit they can provide sufficient steam for generation at 20 MW. The average time from light-up to full load on all four alternators is about 12 hr. Although No. 5 set can be run up in about one-quarter of the time of sets Nos. 6, 7 and 8, it requires longer for load application.

Two single side-inlet, constant-speed forced-draught fans are provided for each boiler. The two induced draught fans/boiler have double side-inlet ducts and are driven by two-speed motors.

Turbo-alternators

The four 120 MW turbo-alternators are arranged in line. The turbines run at 3,000 r.p.m. and are three-cylinder impulse-reaction machines with triple-flow low-pressure cylinders.

The high-pressure steam admission valves are controlled by the main governor, but the intercepting and unloading valves are regulated by an auxiliary governor which can be set independently of the main governor.

Feed heating steam is bled from the turbine at six points for three l.p. heaters, including a deaerator, and

Plant Details

UNITS	All Sets
TURBO-ALTERNATORS:	
Number of turbo-alternators	Four
Continuous max and economic rating MW	120
Speed r.p.m.	3,000
Power factor at generator terminals	·9
Full load voltage kV	13·8
Steam pressure t.s.v. lb/sq in.	1,500
Steam temperature t.s.v. °F	1,000°
Vacuum at C.M.R. in Hg	1·1
Hydrogen cooling pressure lb/sq in.	15
Number of stages in H.P. cylinder	13
Number of stages in I.P. cylinder	19
Number of stages in L.P. cylinder	8 in each of 3 cylinders
Reheat steam pressure lb/sq in.	360
Reheat steam temperature °F	1,000
Exciters. Main/Pilot	460/220 V, 1,250/100 A
CONDENSING PLANT:	
Total cooling surface sq ft	85,000
Quantity of condensate klb/hr	571
Cooling water required g.p.m.	58,000
Condensate extraction pumps/set	Two
Temperature of condensate °F	81
Rating and head of extraction pumps klb/hr; ft	770; 257
BOOSTER AND FEED PUMPS:	
Boiler feed pumps/unit:	Two, 100% duty
Pump rating: klb/hr	965
Pump head: lb/sq in.	1,970
Motors:	Squirrel-cage induction 3·3 kV, 2,700 h.p., 2,980 r.p.m.
Booster feed pumps/unit:	Two, 100% duty
Pump rating: klb/hr	965
Pump head: lb/sq in.	550
Temperature: °F	260
Motors:	Squirrel-cage induction 3·3 kV, 900 h.p. 1,470 r.p.m.
COOLING WATER PUMPS:	
Number of condenser pumps	Four
Rating of each pump g.p.m. at 43·5 ft head	62,500
Condenser pump motors	970 b.h.p., 3·3 kV, 297 r.p.m.
Number of tower pumps	Three
Rating of each pump g.p.m. at 57 ft head	62,500
Tower pump motors	1,270 b.h.p., 3·3 kV, 371 r.p.m.
COOLING TOWERS:	
Number	Two
Capacity million g.p.h.	3·82
Normal cooling range °F	17
SWITCHGEAR:	
275 kV:	
Current rating A	800 and 1,200
Breaking capacity MVA	7,500
Breaks per phase	Six
3.3 kV:	
Current rating A	400, 800, 1,200 2,000
Breaking capacity MVA	150
415 V:	
Current rating A	400, 1,600
Breaking capacity MVA	25

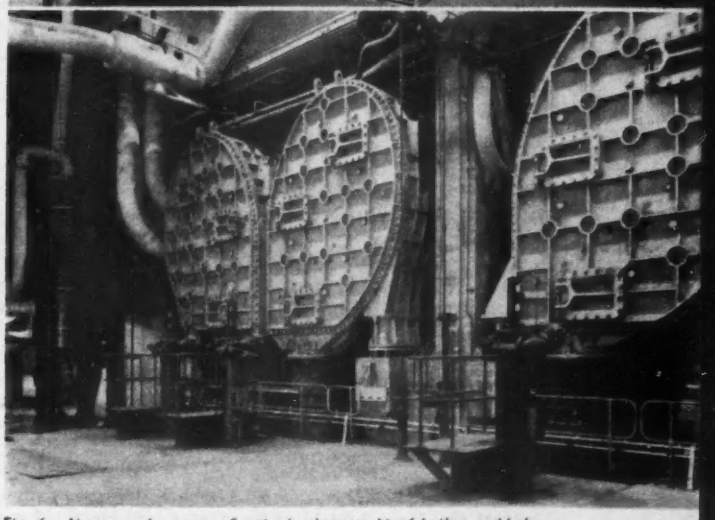


Fig. 6. Above, coal conveyor for the bunkers on No. 6 boiler, and below; Fig. 7. The three-flow surface condensers on No. 5 set. The condensers are designed to give 28·9 in. Hg vacuum when supplied with 58,000 g.p.m. of cooling water at 58°F

three h.p. heaters. The l.p. exhaust steam enters a two-shell, three-flow condenser designed to give 28·9 in. Hg vacuum at full load.

Air is removed from the condenser by three 50% duty rotary hydraulic pumps, and two 100% duty extraction pumps discharge the condensate through two l.p. feed heaters to the deaerator and then to the feed boost pump inlets. Each turbine has twin double-effect evaporating plant producing a net gained output of 40 klb/hr.

The alternators are cooled by hydrogen at 15 lb/sq in. which is circulated through distillate-cooled heat exchangers. The alternator slip-ring brushgear is designed for on-load brush changing, and average brush life of 3,000 hr is being obtained. Both main and pilot exciters are totally enclosed and gear-driven from the main alternator shaft at 750 r.p.m. Voltage regulation is by magnetic amplifier and twin amplidyne sets, the equipment incorporating a follow-up mechanism which permits smooth changeover from manual to automatic control. Brushgear cannot be changed on load on the exciters, but brush life averages 5,000 hr and, so far, most maintenance has been fitted in with other shut-downs. Each set is provided with comprehensive supervisory equipment to indicate speed, output, eccentricity, differential expansion, shaft position and cylinder expansion.

Feed and Water Treatment Plant

From the h.p. heaters, boiler feed enters the boiler feed pumps. These are 100% duty centrifugal units running at constant speed. On No. 5, they operate at 1,950 lb/sq in. seven-stage and, on Nos. 6, 7 and 8, they are 1,970 lb/sq in. eight-stage units. Make-up water from the river is treated and distilled. Before evaporation, it is softened and ammonia is removed. The booster pumps are driven by squirrel-cage induction motors rated 900 h.p., 3·3 kV, 1,480 r.p.m. The feed pump motors are rated 2,700 h.p., 3·3 kV, 2,980 r.p.m. and are also squirrel-cage induction motors.

Cooling water is drawn from the tower ponds by four horizontal centrifugal pumps driven by 970 h.p., 3·3 kV, 297 r.p.m. motors. The three tower pumps are similar in construction but with a greater head, and are driven by 1,270 h.p., 3·3 kV, 371 r.p.m. motors.

The fixed-flow cooling water system is designed to utilise the River Trent as far as possible. It is also used by the "A" station. For taking water from the river, four centrifugal pumps are used, each rated 2 million g./hr.

Unit Control

Two control rooms, each controlling two units, are arranged in the auxiliaries bay between turbine hall and boiler-house. Extensive use has been made of telemetering to avoid bringing h.p. or temperature steam and water connections into the control room. Control auxiliaries are housed in a room immediately below the control room, and from which access can be gained to the underside of the desks for maintenance.

Closed-circuit television has been installed on all four units for monitoring flame conditions in the furnace and also for water level indication. Results with the flame monitoring equipment have not, however, proved as successful as had been hoped.

The closed-circuit installation for the furnaces, not the first of its kind, was intended to help the operator in the correct positional control of the vortex and burner flame. The systems used indicate satisfactorily the lighting-up of the oil burners on start-up but, partially due to the high ash content and slagging nature of the fuel burned, the picture becomes obscure with coal firing. The water level indicator using closed-circuit TV gives instant indication of water level, but some difficulty has been experienced due to obscuration of the gauge glass by water scouring.

The main electrical control room for the "A" and "B" stations is housed in the administrative block between the two buildings. It contains a generator load desk for the "A" station, 275 kV, 132 kV and 3·3 kV controls, control desks for the "A" station river water and "B" station circulating water pumps, alarm and voltage regulating equipment and chlorinating programme clocks for both stations.

The alternators are solidly connected by double-angle section copper busbars to the forced-oil-circulation, water-cooled generator transformers and switched directly at 275 kV. Eighteen air blast c.b's control the four generators, eight feeders, two bus couplers, two bus-section switches and two 275/132 kV, 120 MVA auto-transformers.

Solidly connected to each alternator is a 10 MVA unit transformer providing 3·3 kV supplies for auxiliaries. There are also two station transformers and two 10 MVA banked units for general services and standby for the 10 MVA starting supply transformers. Medium voltages are provided by eleven 1 MVA transformers.

Switchgear for auxiliaries is located on the ground floor of the control block. The 3·3 kV and 415 V switchgear is of the single busbar, air-insulated, air-brake, solenoid type. Motors above 120 h.p. are d.o.l. starting at 3·3 kV or 415 V, motors from 100 h.p. to 120 h.p. are controlled by air c.b's, and the remainder of the 415 V auxiliaries are controlled by air-insulated contactor gear. Total motor h.p. installed in 950 units is about 60,000 h.p., only those for the exhauster, feeder and the separators on No. 5 unit being a.c. variable speed machines.

Thermal efficiency of the "B" station is said to exceed 33% and it is, of course, on three-shift base load working. However, the "A" station is now moving towards the time when it will become a two-shift station. The station superintendent is Mr H. Greenwood (see page 614). Drakelow "B" was engineered by the CEGB Midlands Project Group. The consultants were L. G. Mouchel and Partners.

Principal Contractors and Sub-contractors

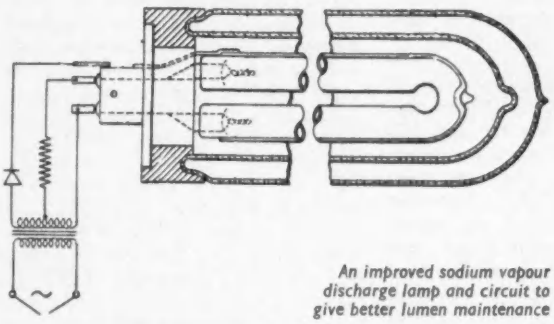
Site clearance, foundations and dust Pipeline	M. J. Gleeson
Building superstructure	J. Gerrard
Boiler plant, No. 5	International Combustion
Boiler Plant, Nos. 6, 7 and 8	Foster Wheeler
Air heaters	Jas. Howden
Sootblowers and control equipment	Hopkinson
I.D. and F.D. fans	Davidson
Precipitators	Simon-Carves and Sturtevant
Steam temperature control	Electroflo Meters and George Kent
Auxiliary motors	LS and E; LD and C
Drum level television	Hopkinson
Combustion chamber television	Rank Cintel and Pye
Automatic control, panels and desks	Electroflo Meters
Alarm equipment	Standard Telephones and Cables
Turbo-alternators and condensing plant	C. A. Parsons
Circulating water pumps	Drysdale
Motors	English Electric
Feed pumps, booster pumps and motors	Harland Eng.
Coal handling plant	International Combustion Products
H.P. steam and feed pipework	Stewarts and Lloyds; John Thompson (Pipework)
Valves and fittings	Hopkinson; Dewrance
L.P.Pipework	Brightside Heating and Eng
C.W. Pipework	Aiton
C.W. Valves	Blakeborough
Auxiliary Pumps	Gwynnes Pumps; Berry Hill Eng; Pulsometer Eng
Water treatment plant	John Thompson-Kennicott
Generator and station Transfrs.	AEI (Rugby), Transformer Division
Station transformers	Yorkshire Electric Transformers
Unit transformers 5 and 6	Crompton Parkinson
Unit transformers 7 and 8	Bonar Long
Switchgear: 275 kV, 3·3 kV and 415 V	A. Reyrolle
415 V contactor gear	AEI (Manchester)
415 V Fuse g'r and dist'n board	South Wales Switchgear
Main alternator conn's.	BICC
Main, auxiliary and control cables	BICC, Aberdare Cables and George E. Taylor
Instruments	Crompton Parkinson, Nalder Bros.

PROGRESS IN PATENTS

SELECTED SPECIFICATIONS

Improved Sodium Vapour Lamp

One of the problems associated with sodium discharge lamps is the gradual absorption of the sodium filling by the glass walls of the envelope. As a result, the overall efficiency in emitted light/W tends to decrease at a greater rate through the obscuration of light output by the film of absorbed sodium on the envelope. It has been found that the passage of a direct current discharge between the outer surface of the envelope and the gas-filled space, such that the outer electrode is positive, while the glass is hot causes the sodium to be liberated from the envelope back into the gas-filled space.



An improved sodium vapour discharge lamp and circuit to give better lumen maintenance

In Specification 880,319, the General Electric Co. of Kingsway, London, describes a form of construction and associated circuit whereby the phenomenon is applied to typical discharge lamps, enabling their useful life to be considerably extended. In one embodiment, the envelope is of soda-glass with a flashing of sodium-resistant, sodium content glass on the internal surface. The outer surface incorporates a transparent conducting coating applied by any of the established methods which is in contact, via the cap, with a small rectifier in the supply circuit, so applying a pulsating, positively polarised p.d. (excusable alliteration) via the envelope. This serves to release sodium from the inner flashing which is sufficient for the normal operation of the lamp without further inclusion of free sodium.

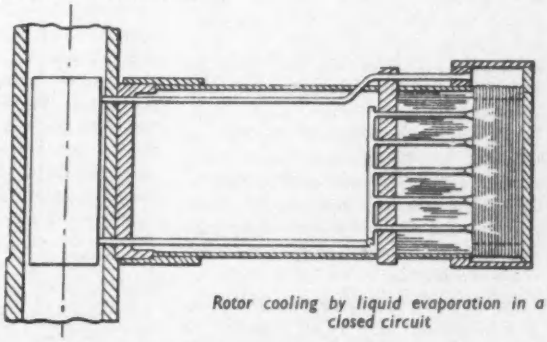
In an alternative embodiment, two narrow conducting strips are applied to opposite sides of the envelope and are electrically connected via rectifiers to the polarising circuit. In both cases, of course, the temperature of the lamp is maintained by enclosure in a Dewar jacket as in normal practice, and it is suggested that the method is equally applicable to lamps with free sodium enclosed or the revival of lamps which have been in service and have acquired an internal coating of absorbed sodium.

High Temperature Capacitor

Most paper dielectric capacitors suffer from the disadvantage that their operating temperatures are limited to around 90°C to 100°C by reason of the forms of impregnant used. A new design, attributed to the Bendix Corporation of New York and described in Specification 880,083, comprises a conventionally wound type of construction, but in which the winding is loose instead of tight. The loose assembly is then impregnated with a dielectric after the usual vacuum heating and drying processes, the preferred dielectric being a low viscosity insoluble silicone resin with a small but effective amount of catalyst. Finally, the drained impregnated assemblies are subjected to pressure across a diameter to form flat, hemispherical-ended units which are baked, whilst still under pressure, to form capacitors which are compact, free from air-pockets or voids and, it is claimed, suitable for operating temperatures up to 600°F without deterioration.

Vapour-cooled Rotors

In large generators, the dissipation of heat from the rotor windings is achieved by a number of methods, including direct and indirect air-cooling, water-cooling and gas-cooling. In Specification 880,262, the English Electric Co. of Kingsway, London, describes yet another method in which the latent heat of evaporation of a liquid coolant is employed for the removal of heat induced and generated in a large rotor winding, the coolant being circulated through channels in the rotor and a self-contained condenser installed in the rotor shaft through which a secondary cooling system of air or other suitable coolant is circulated.



Rotor cooling by liquid evaporation in a closed circuit

Referring to the diagram, it can be seen that the liquid is forced, under centrifugal pressure, from the condenser into a number of spray jets set around the periphery of the rotor in an annular housing enclosing all of the field coils. The liquid is evaporated and the vapour returns through the second channel to the condenser, where the heat is extracted by an air current flowing through the hollow shaft and around the condenser, reconverting the coolant to liquid form.

The system can be designed to accommodate a choice of liquids in the primary cooling circuit, the quantity being sufficient to keep the feed pipes full when the machine is running. Alternatively, gas under pressure can be used either alone or in association with a liquid coolant so long as it is non-corrosive in the presence of the coolant.

Reproduced by permission of the Controller of H.M. Stationery Office. Copies of specifications may be obtained from the Patent Office (Sales Branch), 25 Southampton Bldgs, W.C.2. Price 3s 6d.

Personalities *in the industry*

Mr W. H. Mills

Mr A. J. Wakeling

Mr R. N. Millar

Mr W. A Train

Mr F. J. Goodall

At present manager of the Rhondda district of the South Wales Electricity Board, **Mr W. H. Mills,** A.M.I.E.E., has been chosen as the Board's new district manager for Merthyr and Aberdare district, in place of **Mr A. J. Leather,** M.I.E.E., A.M.B.I.M., who, as we have already noted, is becoming manager of the South Eastern Board's Central Sussex district. The new Rhondda district manager is to be **Mr A. C. Davies,** M.C., A.M.I.E.E., who is now manager of the Pontypridd and Caerphilly district (*ESH, page 132). Mr Mills has been Merthyr and Aberdare district manager since March last, after being district commercial engineer there for about six years. He started his career with the electricity undertaking of the Aberdare UDC and subsequently held various posts there. Mr Davies was district engineer at Rhondda for two years prior to being promoted to his present post. Earlier he had been district engineer at Abergavenny and Chepstow for seven years following experience with the South Wales Power Co.

Mr J. E. L. Robinson, M.SC., M.I.E.E., who is joining AEI, as we reported on 12 Oct., is to take up the position of deputy general manager of the Transformer Division as from 30 Oct., it is now stated. Mr Robinson was previously an executive director of Associated Engineering Ltd. and, earlier, manager of Ferranti's Transformer Department for nine years.

Mr A. J. Wakeling, B.SC.(ENG.), A.M.I.E.E., has recently been appointed chief designer of the Power Transformer Dept. of the British Electric Transformer Co. Ltd. He started at the Hayes, Middx, works as an engineering apprentice, and subsequently joined the staff of the Transformer Engineering Dept. as a senior assistant transformer design engineer, and was appointed a CP management trainee in 1959. He made extensive tours of South Africa in 1955 and Australia in 1957 as a technical representative in support of sales effort in those territories.

Chairman and managing director of the newly formed GEC (Engineering) Ltd., to which we refer on page 622, is **Mr R. N. Millar,** M.A., B.COM., M.I.MECH.E., M.I.E.E., who has been managing director of the Engineering Group. Named as director and general manager (Witton Works) of the new organisation is **Mr T. H. Kelsey,** M.A., M.I.E.E., with **Dr K. J. Wootton,** B.SC.(ENG.), D.I.C., PH.D., M.I.MECH.E., as director and general manager (Erith Works); **Mr C. J. O. Garrard,** M.SC., M.I.E.E., M.AM.I.E.E., as commercial director; **Mr E. Nicholson,** as financial director; **Dr H. K. Cameron,** PH.D., B.SC., F.R.I.C., M.I.CHEM.E., M.I.E.E., as development director; and **Mr G. M. F. Donnelly** as production director. The other members of the board are: **Mr W. D. Morton** as personnel director, and **Mr J. E. Thomas** as secretary. The two new members of the board who are also newcomers to the GEC organisation are Mr Donnelly and Mr Nicholson. Mr Donnelly will join the new company on 1 Jan. next when he will relinquish his appointment as general manager of British Northrop Ltd. Mr Nicholson, whose appointment to the Engineering Group was announced last month, was formerly a deputy director of the Production Group of the UKAEA. Two further important appointments are: **Mr D. W. T. Angwin,** previously chief resident engineer, Hunterston nuclear power station, who becomes assistant general manager, Erith Works, and **Mr J. C. Morris,** previously commercial manager, United Power Co. Ltd., Erith, who now becomes commercial manager, export projects, both appointments effective from 1 Jan. next. Other details of the new organisation are reported on page 623.

Formerly with AEI for four years, **Mr K. B. Hogg** has joined EIC (Electronic Instruments) Ltd., at Richmond, Surrey, as general works manager. With AEI he was works manager at Brimsdown from 1957, running three factories concerned with radio valves, c.r.t's and car batteries, and was promoted to general works manager responsible for the five Southern Group factories in 1958—the Radio and Electronics Components Division. Earlier he had been with Ferranti Ltd. from 1946, commencing as a student apprentice at Edinburgh, and becoming, in 1948, production engineer concerned with the manufacture of power and audio-frequency transformers. In the following year he was appointed manager of the General and Electrical Engineering Dept., being also responsible for development. In 1951-52 he obtained a postgraduate diploma Business Administration at Syracuse University, New York State, after which he became works manager to Ferranti at Dundee, dealing with the manufacture of microwave valves and electronic equipment. From 1956 to 1957 he also lectured in management subjects at Dundee Technical College.

Mr W. A. Train, works manager, and **Mr F. J. Goodall,** chief accountant, have been appointed to the board of W. H. Allen Sons and Co. Ltd. Mr Train, who started with the company as an apprentice in 1925, served on the outside erection staff and was a service engineer from 1936 to 1945, when he became technical representative for the East Midlands area. He was promoted to assistant sales development manager in 1949, and to works manager in April, 1954. Mr Goodall joined the company in March, 1958, after being chief accountant and a director of Brooke Tool Mfg. Co.

**Denotes revision to the "Electricity Supply Handbook, 1961."*

Formerly assistant manager, **Mr J. C. Gladman,** B.SC., has been promoted to manager of the Computer Engineering Dept., AEI Electronic Apparatus Division, Trafford Pk. Educated at Varndean School, Brighton, and Manchester University, where he studied electrical engineering under Prof Willis Jackson and Prof F C. Williams, he joined Metropolitan-Vickers Electrical Co. in 1948 as an engineer in the Radio Dept., and worked on, among other things, airborne radar, telemetering equipment for guided weapons and the design and application of digital computers. He became assistant chief engineer of the Computer Dept. in May, 1959, and two months later, on the formation of the AEI Electronic Apparatus Division, was appointed assistant manager, Computer Engineering Dept. Mr Gladman has visited America three times during the past five years to study work there on computers.

The Rt Hon Lord Citrine, C.B.E., LL.D., COMP.I.E.E., has been reappointed as a part-time member of the Electricity Council.

Head of the Electronics Department of the British Scientific Instrument Research Association since 1957, **Mr R. E. Fischbacher,** A.R.C.S.T., A.M.I.E.E., has now been appointed an assistant director of the Association. Prior to joining the latter he served for 12 years in the Admiralty Signal and Radar Establishment as a member of the RNSS.

Lord Nelson of Stafford, Sir John Paget, Sir Archibald Hope and **Mr A. J. Penn** have resigned from the board of D. Napier and Son, a subsidiary of the English Electric Co. Ltd. **Mr G. Nelson** has been appointed chairman of D. Napier and Son; **Mr G. A. Riddell** has been appointed a director and becomes deputy chairman; and **Mr P. J. Daglish** becomes managing director. **Mr H. E. C. de Chassiron** has resigned as managing director, but retains his directorship.

Mr G. L. Bibby, B.SC.(ENG.), A.M.I.E.E., and **Dr A. E. D. Heylen,** B.SC., PH.D., have been appointed lecturers in the Department of Electrical Engineering at Leeds University. Mr Bibby's appointment was effective from 1 Oct. and that of Dr Heylen from 1 Jan., 1962.

The Councils of the University of Manchester and the Manchester College of Science and Technology have approved the appointment of **Dr C. Adamson,** M.SC.(ENG.), D.SC., A.M.I.E.E., to a newly created (second) Chair in Electrical Engineering in the Faculty of Technology. He has been senior lecturer in electrical engineering at Manchester since 1959, after seven years as lecturer there. He gained his M.Sc.(Eng.) in 1952 as a result of research work while an assistant lecturer at the Bradford College and as research engineer with A. Reyrolle and Co. He was awarded his D.Sc. last July. Dr. Adamson has been particularly responsible over the last few years for the development in the College of an extensive Power Systems Laboratory, for both undergraduate and postgraduate work, the latter forming a large sub-section of the postgraduate school in electrical engineering. His various projects have received substantial industrial support, much of it under contract, and have resulted in the filing of several UK patents, some of which have also been filed in the USA. Dr Adamson has personally, and in conjunction with colleagues, published a large number of original papers and a textbook. He is a College representative on ERA, has served in an expert capacity on committees of CIGRE, and is editorial adviser to the journal *Direct Current*. He has recently served, by invitation, as Visiting Professor at the University of Roorkee, India, under the Colombo Plan, and has lectured at the Universities of Washington and Wisconsin, USA.

At the annual dinner-dance of the ASEE Liverpool and District branch. Left to right, back row, Mr R. N. Pegg (chairman, Mersey and N. Wales Centre IEE), Mr W. G. D. Gregg (national chairman, ASEE), Mr J. R. Atkinson (chairman, Liverpool and district branch, ASEE), Mr B. W. Hardacre (branch secretary), Sir Willis Jackson (ASEE president), and Mr L. Harper (member, Executive Council). In the front row, left to right, are Mrs R. N. Pegg, Mrs. J. R. Atkinson, Mrs W. G. D. Gregg, Lady Jackson and Mrs L. Harper

Mr F. D. M. Gamble, M.I.MECH.E., M.I.MAR.E., is the new president of the Diesel Engineers and Users' Association.

Mr S. Davis has been appointed a director of the Backer Electric Co. Ltd. where, since joining the company in 1938, he has been closely connected with the development of the tubular sheathed element process under Mr C. B. Backer, the founder, ultimately becoming production manager in 1942 and works manager in 1953. In recent years he has played a major part in extending the production facilities to include an alternative manufacturing process employing the latest American techniques.

Mr S. Davis

Rear-Admiral J. Y. Thompson has joined Elliott Brothers (London) Ltd. and is to assume special responsibilities in connection with the company's work for the Royal Navy.

Chairman and managing director of Wolf Electric Tools Ltd., **Mr G. M. Wolfe** flew to Australia last week-end on a four weeks' business trip.

Divisional secretary of the South Wales Division of the CEGB since 1959, **Mr G. Newman,** F.C.I.S., D.P.A., M.B.I.M., is joining the CEGB headquarters staff on 1 Nov. as the administrative officer in the Secretary's Department (*ESH, pages 49, 64). He has been with that Division from 1948, initially helping to build the Establishment Section, and in 1953 was promoted from principal assistant in that Section to the post of principal administrative assistant. He became senior assistant secretary in October, 1956.

Mr G. B. Seawright, who initiated the formation of Arrow Electric Switches Ltd., in the UK in 1929 on behalf of the parent company, Arrow-Hart and Hegeman Electric Co., of Hartford, Connecticut, is now in this country on a short visit. He performed the official opening ceremony of the new Southall works yesterday. Mr Seawright directed the British concern for many years and only returned to the US in 1950 to become executive vice-president of the parent company.

The Minister of Power has reappointed **Mr D. G. Brown,** O.B.E., J.P., M.I.MECH.E., as chairman of the North Eastern Electricity Consultative Council.

Mr J. E. Swainson and **Mr A. S. Moseley** have been appointed directors of Permali Ltd.

Mr W. H. Thompson, C.S.I., is to retire from the board of the Calcutta Electric Supply Corporation Ltd. after the annual general meeting on 9 Nov. Mr Thompson was secretary of the company from 1936 to 1945, since when he has been a director.

Superintendent of Drakelow "A" and "B" power stations for the past seven years, **Mr Harry Greenwood,** A.M.I.MECH.E., A.M.I.E.E., has also been appointed to a similar position for the "C" station, now under construction for the West Midlands Division of the CEGB. He will thus control all three stations: "A," "B" and "C," and can claim to be the first superintendent to be appointed in charge of a total power plant in excess of 2,000 MW in Britain (*ESH, page 69). Prior to going to Drakelow, Mr Greenwood was station superintendent at Agecroft "B" for four years, after holding a similar position at Wolverhampton (1945 to 1950) and Great Yarmouth (1942 to 1945). Educated at Barnsley High School and King Edward VII School, Sheffield, he also studied at the Manchester College of Technology, Salford Royal Technical College and Sheffield University. He served an apprenticeship with Metropolitan-Vickers Electrical Co. and, following experience with Carlton Collieries and the ICI power plant, was charge engineer at Padiham power station, Lancashire Electric Power Co., from 1931 to 1939, when he went to Sculcoates station, Hull.

Mr G. T. Coughtrie has joined the board of Bruce Peebles and Co. Ltd., and **Mr A. McKellar** has joined the board of Belmos Co. Ltd.

Mr P. M. C. Edgington and **Mr V. E. White** have been appointed directors of Sterling Electric Holdings Ltd.

Previously with the Furnace Department of the General Electric Co. Ltd., **Mr M. J. Severs,** B.SC., A.M.I.MECH.E., is joining Efco Furnaces Ltd. as technical manager of their new Vacuum Furnace Division at Sheerwater, near Woking, as from 1 Nov. Sales manager of the division will be **Mr W. Kuyser,** B.SC., formerly vacuum sales manager of General Engineering Co. (Radcliffe) Ltd.

Newly appointed to the board of A. C. Morrison (Engineering) Ltd. are **Mr D. B. Waugh,** F.C.A. (financial director), and **Mr D. L. Coller,** B.S., A.M.I.E.E. (sales director).

OBITUARY

Mr A. G. Lang, sales manager of the Electrical Measurement Division of Elliott Brothers (London) Ltd. since 1941, died on 16 Oct. as the result of injuries received in a road accident. He was educated at Finsbury Technical College, joined Siemens Brothers at Woolwich in 1912, becoming manager of the Measuring Instrument Department, and transferred to Elliott Brothers, Lewisham, as sales manager of the Electrical Measurement Division in 1941. His many activities included service on several technical committees in connection with BEAMA and he was also chairman of the Instrument Transformer Committee.

Mr W. Howes, M.I.MECH.E., M.I.E.E., formerly chief engineer of Harrods Ltd., died on 18 Oct.

Mr F. A. King, C.B.E., A.M.I.E.E., formerly joint managing director of Kelvin and Hughes Ltd., died on 18 Oct. Mr King, who retired in 1955, was one of the last links with Lord Kelvin, being frequently in contact with him in the early 1900's. During the 1914-18 war he was concerned in the design and production of compasses, and afterwards turned to electro-medical apparatus, becoming managing director of Kelvin Bottomley and Baird in 1935. With amalgamation of the firm with Henry Hughes Ltd., Mr King became joint managing director of Kelvin and Hughes Ltd., a position he held until he became consultant director to the company.

Materials for Electrical Design

SILICONES IN ENGINEERING

THE usefulness of silicones and the wide variety of applications in electrical engineering is now fully established. In particular, the various insulating materials based on silicones have properties which are unique: good insulation, water-repellency, high resistance to thermal shock and to elevated temperatures and, above all, thermal stability. At high voltages, the low dielectric loss and resistance to corona is also invaluable, and no fear of corrosion on metal parts in contact need be entertained since silicones are totally unreactive chemically.

Silicone elastomers possess all of the resilience and "stretchability" of natural rubber without its lesser resistance to ageing, ozone and solvents; moreover, sub-zero temperatures which make the natural rubber brittle to handle or bend, leave the resilient characteristics of the silicone counterpart unaffected down to −70°C.

Silicones, of course, have many other applications: as lubricants, release agents for moulds, pressure seals at low and high temperatures, gaskets, damping fluids, paints and varnishes, etc. A useful summary of these applications is given in the recent booklet, "Silicones in Engineering," published by Midland Silicones. It may not say anything new on the subject, but it is a useful reminder to the engineer of many uses which he has "forgotten to remember"! *Midland Silicones Ltd., 68 Knightsbridge, S.W.1.*

PRECIOUS AND SEMI-PRECIOUS METALS

IN semiconductor technology, considerable use is made of precious metals and alloys, some of which are produced specially for such work. "Nilo-K," a nickel-cobalt-iron alloy containing 29% Ni and 17% Co, is now available from Johnson Matthey in strip, 3/32 in. to 2 in. wide, clad on either side with 0.5% antimony-gold, the cladding thickness on either face being 11·5% or 18·75% of the total thickness. This material has been produced in sample quantities for semiconductor devices and quantity production is planned for early next year.

Another development is concerned with Mallory 73 beryllium-copper. In the past this metal has been extremely heavy on tools with which it has been used and research has established the presence of a hard and abrasive oxide, beryllia, as the cause. Now, strip up to 0·025 in. thick can be supplied with beryllia-free surfaces which will reduce tool wear considerably. *Johnson Matthey and Co. Ltd., Hatton Gdn, London E.C.1.*

ANTI-CORROSIVE COATING

A COMPLETELY new anti-corrosive coating for metal, brickwork, concrete, plaster, etc., has recently been marketed under the name of "Adcora Pervon" (A.4). This is a polyurethane pitch compound with a unique curing system which is operative down to 0°C. Moreover, it is operative under conditions of high humidity which normally prohibit the use of cold catalysed materials and, when cured, it exhibits exceptional resistance to fatty acids, solvents, inorganic acids and alkalis, aliphatic and aromatic liquids, mineral oils and greases and distilled water.

The catalyst is admixed with the base in proportions of 3:13 by volume or 1:5 by weight, the resulting mix having a "pot life" of about 2 hr at normal ambients. Coatings are tack-free 2 hr after application, hard-dry in 17 hr and fully cured in four days. At 90°C full cure takes place in 15 min, but a 30 min "flash-off" period at normal ambient temperature is advised before stoving.

"Pervon" may be applied by brush or spray, but, as would be expected from a pitch-containing compound, the normal colour is gloss black. It may be "overcoated" by a range of synthetic topcoats in colour.

Water absorption after 40 days is less than 1% of the film weight, about one-quarter that of similar epoxy coatings. Dielectric strength is given as 400 V/mil. Fuller technical details are available on a number of data sheets. *E. and F. Richardson Ltd., Buckingham.*

METAL DATA SHEETS

INFORMATION on high purity metals, including noble, rare earth and base, is given in a new series of data sheets which have been specially compiled by Johnson Matthey and Co. The general properties of each element are tabulated together with details of the forms of current production. *Johnson Matthey and Co. Ltd., Hatton Gdn, E.C.1.*

O.H. transmission progress

MECHANICAL INVESTIGATIONS PROMINENT AT C.E.R.L.

ELECTRICAL design and performance of overhead lines has been the subject of much research. Less attention has been given to mechanical design. The balance is being restored to some extent in the Central Electricity Research Larobatories of the CEGB, as the director, Dr J. S. Forrest, M.A., D.SC., M.I.E.E., makes clear in his chairman's address to the IEE supply section, delivered last week.

When bundle conductors came to be adopted, the necessary spacers gave more trouble than had been anticipated. Movement of the conductors damaged the spacers and showed the need to simulate line conditions in evaluating spacer designs. Such a machine is now in use by the CEGB, simulating relative vertical movement of conductors, relative longitudinal movement and relative angular movement, with all the parameters adjustable in magnitude.

Long O.H. Crossings

More troublesome still on long crossings has been oscillation of the o.h. conductors. It is the slow, large-amplitude oscillations (dancing or galloping) that cause the trouble; sustained relatively high frequency vibrations are relatively easy to suppress with simple mechanical dampers.

Until recently, conductor galloping was thought to be associated with formation of ice on the conductor. The ice alters the thermodynamic shape of the conductor so that a steady wind can lift it and set it into oscillation at a frequency that is some harmonic of the natural frequency of the catenary. Conductor clashing on the 275 kV Severn crossing (5,310 ft span, 1·7 in. diameter conductors) made it clear that icing is not a necessary preliminary.

Records taken on the crossing indicate that, in addition to pendulum-like swinging of the conductor, there are two forms of vertical oscillation, each with a period of about eight seconds. The more serious of these has attained an amplitude of 36 ft.

Wind-tunnel research has established that at certain wind velocities and angles of wind to conductor, a substantial lift force occurs. This arises because of a differential separation of the boundary layer of air around the stranded conductor. The lift can be sustained only with the wind gusting, unlike the steady lift and galloping when ice has formed on the conductor. The force has been determined (by analogue computation) as large enough to cause clashing of conductors.

It is possible to reduce the aerodynamic lift by using a conductor with a smooth cylindrical outer surface, but it is not yet known whether this will effect a complete cure. As an experiment, p.v.c. tape is being applied to the conductors of one circuit of the Severn crossing. The investigation has emphasised the need for better understanding of the dynamics and aerodynamics of a suspended catenary.

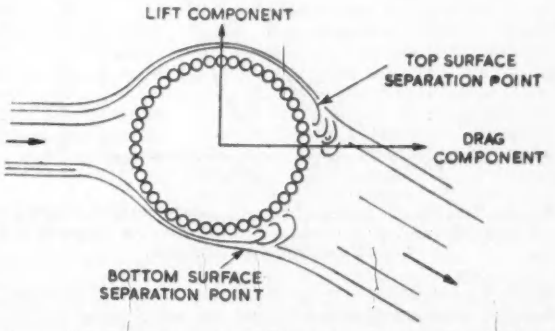


Fig. 1. Mechanism by which wind flow gives an aerodynamic lift force on a stranded conductor. A typical flow pattern is shown, assuming wind direction about 17° off right angles to the conductor direction. The conductor has 42 outer strands of 0·113 in. diameter wires laid up with a helix angle of 17°

Foundations

Recently, tests have been carried out to check the assumptions made about uplift in the design of tower foundations. The usual assumption is that the resistance of uplift is provided by the weight of the foundation, plus the inverted frustrum of a pyramid of soil (of sides 30° to the horizontal) above it. Tests carried out when existing lines have been removed have given the following indications:

The volume of soil uplifted is often much less than that of a 30° pyramid frustrum.

The compaction of backfill is often quite inadequate and little uplift pressure is transmitted through the backfill/virgin soil interface.

The shear strength of the soil, which is neglected in the design, contributes to the strength of the foundation.

The suction (or tension) below the base of the foundation which is neglected in the design, contributes up to a quarter of the ultimate strength.

Electrical Characteristics

Interest in the mechanical behaviour of overhead lines, of which only two examples out of several have been described, does not mean that electrical design is in any way being neglected by the Central Electricity Research Laboratories. Bundle conductors, for example, are receiving plenty of attention, and there are still unexplained features of their behaviour.

A plot of the characteristics of bundle conductors as against single conductors shows that for the same voltage the surface voltage gradient with twin conductors is much lower than for bundle conductors. On the other hand, for the same gradient, the power loss for the twin conductor is greater. It is proportional to the square of the total surface areas of the conductors.

For radio noise, the strength for the same voltage is less

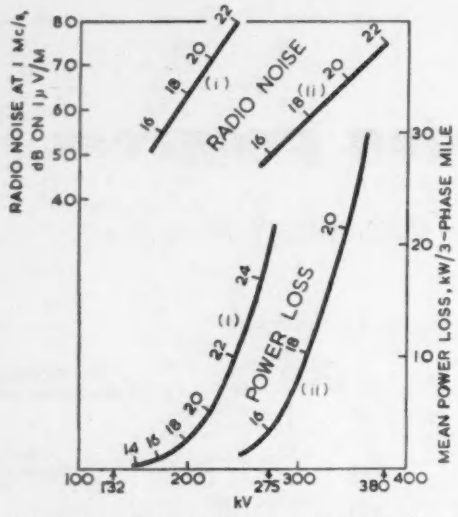


Fig. 2. Mean corona loss and radio noise under the line for single (i) and twin (ii) 0·175 sq in. conductors. The figures on the curves are surface gradients in kV r.m.s./c.m.

with two conductors owing to the lower surface gradient, but for some unexplained reason, the radio noise for the same gradient is about 5 dB less than for single conductors.

Another advantage of multiple conductors is the smaller reactance compared with a single conductor. The resultant increase in current-carrying capacity of transmission lines when the effect of high voltage as well is taken into account is described by Dr Forrest as "quite dramatic." He quotes the load-carrying capacity of a single conductor (0·175 sq in.), 132 kV circuit as about 5,000 MW miles; of a twin-conductor (0·4 sq in.), 275 kV line as 55,000 MW miles; and of a four-conductor (0·4 sq in.), 400 kV line as 150,000 MW miles.

Distant Future

In the concluding section of his address, Dr Forrest looks to the distant future and to possible power engineering applications of superconductivity. Now that the US Bell Laboratories have discovered that a niobium-tin alloy retains its superconductivity in high magnetic fields, the chances of power applications with current densities as high as 100,000 A/sq cm are much increased. Refrigeration to the temperature of liquid helium would be necessary, but the fundamental scientific barrier has been removed.

If a refrigerated cable of such a material proved possible, then it might be practicable to have long-distance d.c. transmission with no high voltage, because of the absence of resistive voltage drop. This would not be possible with alternating current because of the reactive drop.

MANCHESTER'S NEW TV CENTRE

JOINING the host of modern buildings which are rapidly changing the Manchester skyline is the new administrative block of Granada TV. The ten-storey block was completed as the fourth stage in development of the site. Already completed is one studio of 4,560 sq ft, a central control room and rooms for telecine and video tape equipment, while two further studios, each with an area of over 3,500 sq ft, are under construction.

The new block has r.i.c. construction with front and rear curtain walls of anodised aluminium and glass.

The electrical installation, which includes three electronically controlled lifts, and the heating and ventilating plant for the whole centre, was carried out by Troughton and Young. The incoming supply is at 6·6 kV and is transformed to 415/240 V by a 500 kVA transformer in a basement substation. A 600 A, four-pole rising busbar system supplies power for lighting and for the 13 A ring main sockets on each floor.

Flexibility in office layout is catered for by a system of ceiling ducting for lighting fittings, three-compartment underfloor ducts for socket wiring, GPO and television services, and wiring compartments in the office partitions. Lighting is standardised on 5 ft fluorescent fittings attached directly to the trunking. Sub-contractors were Atlas Lighting, and nearly 420 twin-tube fittings have been installed, including opal diffuser fittings.

A feature of the two studios now under construction is the overhead grid for suspending studio lighting equipment and scenery. Lighting equipment is suspended from telescopic arms through slots in this grid. A lamp changing gallery will enable maintenance to be carried out without taking up studio floor space.

Fig. 1. Administrative block of Granada TV adjoins completed studios and buildings

Fig. 2. Entrance foyer of the ten-storey block is designed for exhibition use

STANDARDISATION PROGRESS

BRITISH STANDARDS . . . INTERNATIONAL RECOMMENDATIONS . . . INDUSTRY CODES

TRANSFORMERS for use in ships are the subject of BS 3399:1961, which has been kept closely in line with BS 171:1959, covering power transformers generally. The new standard has been prepared at the request of the IEE; it covers double-wound transformers rated from 1 kVA to 1,000 kVA with voltages up to 3·3 kV.

Differences from BS 171, are relatively few, except for those introduced by the narrower range of ratings covered by the new standard. The principal changes relating to marine practice are some clauses requiring satisfactory operation of BS 3399 transformers when the ship is at an angle of as much as 22½° to the horizontal. Also, 60 c/s is recognised as a standard frequency as well as 50 c/s.

There are two preferred ratings additional to the BS 171 list, 10 kVA and 15 kVA, and the service conditions listed in terms of ambient temperature and other conditions are more severe than in the general transformer standard.

Transformers are required to withstand for 2 sec a short-circuit current equal to 25 times rated current, or the maximum current that can flow at the winding terminals, whichever is lower. Test voltages are 2·5 kV for transformers under 1 kV rated voltage, 3 kV for 1 kV rated voltage, and 8 kV for 3·3 kV rated voltage. The standard includes extensive sections on marking of terminals and the arrangement of windings.

GLASS-FIBRE

A SET of standards for woven glass-fibre fabrics for plastics reinforcement has been published in three parts and it is probable that further parts will follow. Part 1 of BS 3396 covers loom-state fabrics and part 2 deals with fabrics which have been desized. The first part is intended to cover glass-fibre fabrics woven from continuous filament yarn in a range of thicknesses and weaves. Fabrics are usually intended after treatment for reinforcement of rigid plastics mouldings and laminates with resin systems, such as polyesters, epoxides, phenolics, silicones and melamines.

The second part requires the fabric to have flexibility and drapability, such as will withstand normal handling; also the fabric has to be uniform and free from stains or streaks. Part 3 covers fabrics in the first two parts which have undergone finishing treatment to make them suitable for use with polyester resins. Various treatments are provided for and requirements are laid down in relation to the final properties of the material.

Tests for Fork Trucks

A SERIES of tests for fork-lift trucks has been devised by the British Industrial Truck Association and adopted in the United States and by associations of manufacturers in 11 European countries. Basically, tests are carried out on a tilting platform and the resulting standards of stability are divided into trucks with basic capacity up to 10,000 lb at 24 in. load centre; and trucks over 10,000 lb and up to 20,000 lb basic capacity at 24 in. load centres. Tests carried out check on longitudinal stability, both static and travelling, lateral stability when stacking and lateral stability when travelling. Stability angles are stated.

New B.S.I. Work

FOUR more standards in the BS 3456 series on testing and approval of domestic electrical appliances should result from new work started by BSI. They refer to the general requirements of section A1 of the standard, which has now been published. The subjects are to be: electric room heaters (section A11); electric cookers (section A12); thermal-storage electric water-heaters (section A13, covering thermostatically controlled heaters with capacity up to 66 gallons); and radiant boiling plates (section A14). Other standards work begun includes preparation of a new section of BS 1523, which is a glossary standard. The new section will cover terms relating to automatic regulators. Also of electrical interest is the work started on a standard for analogue data transmission systems for aircraft. It will state requirements for the interconnection of analogue transducers in aircraft data transmission systems.

Fractional H.P. Motors

A WIDER range of frame sizes has been included in BS 2048:1961, part I, *Dimensions of Fractional H.P. Motors for General Use*, which supersedes the 1953 edition. The number of frame sizes has been increased to five and specifications for dimensions are those necessary to ensure that motors of different make, but of the same frame size, will be mechanically interchangeable so far as shaft and mounting dimensions are concerned. For practical purposes and for common frames, the shaft and mounting dimensions are interchangeable with those laid down in part of the American NEMA standard dealing with fractional h.p. motors. Exceptions are in the mounting dimensions for Frame 42 and for flange-mounted motors. The standard applies to dimensions of fractional h.p. motors for general use with foot, flange or resilient base mounting. It is applicable to dimensions of single and polyphase a.c. and d.c. motors having enclosures in accordance with BS 170.

Indicating Tachometers

IN BS 3403:1961, *Indicating Tachometers for General Industrial Use*, it has been found necessary to limit the requirements to construction, performance and accuracy. Three grades of industrial tachometer are specified in the standard, which covers scale ranges, constructional details, marking, performance and tests. The three grades are those with nominal accuracy of ±0·75%, ±1·5% and ±3% of the maximum scale value. Manufacturers who claim their tachometers comply with this standard must mark instruments with the standard number.

ANODIC COATINGS ON ALUMINIUM

THE first edition of BS 1615, *Anodic Oxidation Coatings on Aluminium*, was published in November, 1949, and a revision appeared in February, 1958. Now a second revision, BS 1615:1961, has been prepared to bring the specified properties and methods of test into line with current practice.

In the new edition, anodic coatings are classified by thickness only and without reference to the type of electrolyte. In this way new grades are able to be incorporated as they are developed and, in addition, a 1 micron grade for infra-red reflectors is introduced with, at the other end of the scale, a 35 micron grade for architectural purposes. Intermediate grades are supplemented and, in a few cases, slightly altered.

Other changes include a simplification of the method by which measurement of light reflectivity is determined, the new test using a modified gloss head for specular reflectivity and the PRS head for total reflectivity, an upgrading of the requirements for fastness to light and the supplementation of the thickness test by a microsection method. Tests which have been dropped include the resistance to finger-printing and resistance to abrasion, both being considered as unrepresentative.

The foreword issues a note of warning: It is essential that purchasers should state the clauses which are relevant in an inquiry or order. Asking for anodising to BS 1615:1961 alone is insufficient.

new products and appliances

Cable and pipe locator

A PORTABLE oscillator and detector is now available in compact form for locating buried pipes and cables either for determining a fault position or surveying a route for cable laying. The oscillator is connected to one end of the pipe or dead cable and the route is "walked over" with the detector unit comprising search coil, instrument and earphones. Cables should, of course, be earthed at the far end and the plotting of the route can be effected easily and with great accuracy. For live cables, the oscillator is not necessary as the detector will pick up the 50 c/s mains frequency equally well. *Metal Detection Ltd., Bickford Rd, Witton, Birmingham 6.*

Embedded floor-warming system

CONSTRUCTION of Tyrad's floor-warming cable has been revised. It now employs high temperature p.v.c. sheathing and insulation and, at the same time, new resistance wire has been introduced for two of the ratings with subsequent price reductions. Elements are now constructed from single-core nickel, bronze alloy, nickel-chrome and copper-nickel. Prices for various lengths and ratings are as follows:

	Length	Watts	List Price £ s d
ES. 35A	140 ft	350	1 14 0
ES. 50A	100 ft	500	1 11 0
ES. 75A	140 ft	750	1 16 0
ES.100A	185 ft	1 kW	2 11 0
ES.163A	320 ft	1·63 kW	3 6 0
ES.218A	425 ft	2·18 kW	4 16 0
ES.326A	600 ft	3·26 kW	7 5 0

Tyrad Electric Ltd., Basil St, S.W.3.

Fault warning system

INCORPORATING solid state electronic techniques, the latest Gresham Fault Warning System has been designed to call immediate attention to faults in any type of automated plant. There are no relays whatsoever and the equipment is made in modules enabling the system to be applied to almost any type of automatic plant quickly and economically. It will give clear indication of when the fault occurs, when it is being attended to and when it has been corrected, and will also record transient or fleeting faults. *Gresham Automation Ltd., Twickenham Rd, Hanworth.*

Automatic fluxing device

IN the production of printed circuits, an important stage is that of flow-soldering the boards with the components in position and a prerequisite to the flow-soldering is flow-fluxing; that is, providing a thin but adequate film of flux across the metal surfaces prior to entering the solder bath.

To those who are contemplating the installation of a production line of printed-circuit assemblies, the Fry "Flow-fluxer" and the companion machine, the Fry "Flowsolder" are useful and important machines which will solve problems arising from the designing of such a line "from scratch." Moreover, the company has a long history of achievements to call on and can give valuable advice both as regards the machines and the grades of solder, flux and cleaning fluids to be used. *Fry's Metal Foundries Ltd., Willow La, Mitcham, Surrey.*

Transformer clamp

A NOVEL design of transformer clamp enables an assembly of C-cores in shell type transformers to be achieved without the conventional steel banding and soldering techniques or the use of screw-bands. The frame automatically lines-up the C-cores and enables assemblies to be carried out rapidly and at low cost. *MKS Nucleonics Ltd., Queens Rd, Watford.*

Panels for tubular heaters

STYLING strips for mounting between banks of their "Thermotube" tubular heaters are now available from Ekco. These strips are said to enhance the appearance of the heaters which, for several years, have found uses in homes, commerce and industry. The strips are supplied in 2 ft., 3 ft., and 4 ft. lengths. Prices respectively are 6s 6d, 7s 6d, and 8s 6d. *Ekco Heating and Electrical Ltd, Old St, E.C.1.*

Brite-Glo improvement

THE Brite-Glo packaged ceiling panels from Courtney Pope are now to be supplied with aluminium edgings finished in stove-enamelled cream. This is available at no extra cost and manufacturers say the revision is due to customer demand. *Courtney Pope (Electrical) Ltd., Amhurst Pk, N.15.*

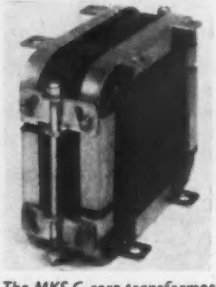
Batch rotary drum furnace

THOUGH rotary drum furnaces are usually associated with continuous production, a furnace of this type recently delivered to the Austin Motor Co. has been designed for batch work. The maximum operating temperature is 1,000°C, achieved by internal radiant tube elements arranged in two zones and with a total loading of 72 kW. The furnace is used mainly for carburising, using endogas plus propane. The heating elements are of the low-voltage type supplied by oil-cooled transformers and single point recording controllers and a timer giving automatic batch control. A thermal fuse protects the furnace and its contents against accidental overheating. *Wild-Barfield Electric Furnaces Ltd., Otterspool Way, Watford, Herts.*

Autumn promotion

AN attractive display card for point-of-sale has been produced by Venner for the winter promotion of their "Autopoint" domestic time-switch. The card, in the shape of a house, pinpoints uses for the time-switch and has provision for two units to be displayed. *Venner Ltd., Kingston By-pass, New Malden.*

Complete equipment for detecting buried cables and pipes showing the detector and oscillator units in the background with the search coil and phones in front



The MKS C-core transformer clamp which simplifies assembly

Venner's point-of-sale showcard for their "Autopoint" time-switches

Glass-fibre insulated flexibles

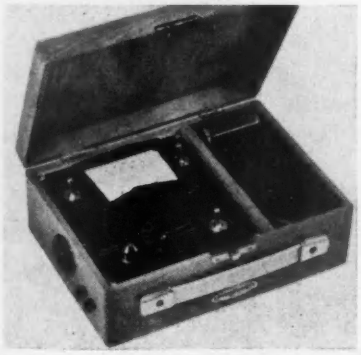
IT had to come. The higher cap temperatures experienced with the more compact tungsten filament lamps of present-day design impose severe duty on lampholders and their associated flexible cable insulation. Certainly, rubber insulation rapidly deteriorates under the strain and even p.v.c. insulation is not too happy in many circumstances. Now a flexible glass-fibre insulated cable has arrived for use in lighting fittings. The glass-fibre insulation is treated with a varnish binder and filler which are good up to 180°C, but even if this temperature is exceeded, the glass-fibre insulation will remain intact. *British Insulated Callender's Cables Ltd., 21 Bloomsbury St, W.C.1.*

Krypton lamps

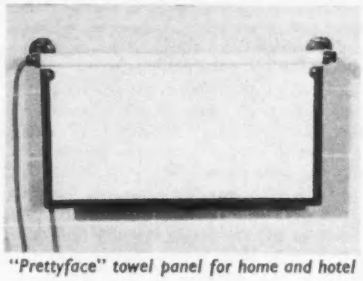
IT is well known in lighting circles that krypton gas included in the envelope of a lamp bulb in place of argon enables the filament to be run at higher temperatures with better efficiency. Unfortunately, krypton is really a rare gas and horribly expensive to isolate. On the Continent production has been raised to the level at which the use of krypton in 25 W and 40 W opal candle and ball lamps is now possible and these lamps, by Tungsram, are available here from the UK distributors. The envelopes are smaller than conventional argon-filled equivalents and can be obtained with b.c., s.b.c. or s.e.s. caps. *Hall Electric Ltd., Anglers La, Kentish Town, N.W.5.*

New volt-wattmeter

A MULTI-PURPOSE instrument designed primarily for the measurements on f.h.p. motors as used in domestic electrical equipment, the "P.8006 Robinair" Type 4 volt-wattmeter provides three measuring facilities; a.c. volts 0-150 and 0-250 50 c/s a.c., watts 0-250 and 0-750 with x 10 scaling and a continuity test by battery and buzzer. The wattmeter operates in a somewhat different manner to conventional instruments but allows for power factor and indicates true watts over the range for which it is calibrated. The instrument is contained in a wooden case, 9¾ in. by 7 in. by 3¼ in. high and weighs 4½ lb. The price is £22 7s 6d. *J. W. Pickavant and Co., Bow St, Birmingham 1.*



The "Robinair" Type 4 volt-wattmeter measures volts, watts and continuity



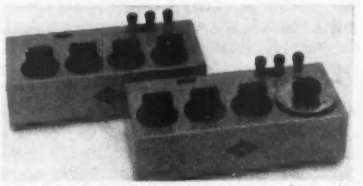
"Prettyface" towel panel for home and hotel

Towel panel for home use

SPECIALLY designed for home, hotel and club use is the "Prettyface" towel panel. It is said to be ideal for drying and airing all types of towels and is designed to ensure free circulation of air between heater and clothes. The panel is suspended from two brackets and allowed to swing freely. Finish is in a heat resistant material and fittings are of chromium. The panel is 18 in. wide, 10 in. high and ½ in. thick. Cost is £1 19s 6d including purchase tax. *Barton Electric Ltd., Oxford Rd, Burnley.*

Decade resistance boxes

FOR the laboratory or educational purposes, a neat range of decade resistance boxes has just been made available in the UK. Of Danish manufacture by the well-known company of Danbridge, they include pure resistance types from 10 x 0·1 ohm to 10 x 1 megohm; ferrite cored inductors from 10 x 1 mH



Two ferrite cored decade inductors from the Danbridge range

to 10 x 1 H; condensers from 10 x 0·001 mf to 10 x 1·0 mf and air-cored inductors from 10 x 1 mH to 10 x 100 mH. All of the instruments are in the laboratory approved standard finish of a teak box with black insulated front panel. *Metrix Instruments Ltd. (Distributors), 54 Victoria Rd, Surbiton, Surrey.*

New a.c. switches

FRONT-OPERATED switch-fuses in four ratings—20 A, 30 A, 60 A and 100 A—and in four types, s.p. and n.; d.p.; t.p.; t.p. and n., are a new line just released by Wm. Sanders and Co. The casings are modern styled in heavy gauge zinc-coated steel with flush lids and no external projections. The switches are short-break a.c. types with heavy duty solid-silver contacts and are mounted in the lower half, opening of the upper half to gain access to the fuses automatically switching to the "off" position. The fuse units are "Sandaspeed Duplex," prices ranging from 40s to 257s.

This range is to be known as "Sandacee" and an extension of the range shortly to be available is a similar design without fuses. *Wm. Sanders and Co., Wednesbury, Staffs.*

Level control for liquids

DESIGNED to provide single- or two-point control of the level of liquid in containers is the "AutoDip" from Lancashire Dynamo Electronic Products. It is said to be particularly suited to applications where container depth necessitates the use of long probes. "AutoDip" operates on the change in electrical resistance as the liquid contacts the probe; the change in condition is detected and used to operate an internal relay. The unit will operate over a resistance range from 0-500,000 ohms. *Lancashire Dynamo Electronic Products Ltd., Rugeley, Staffs.*

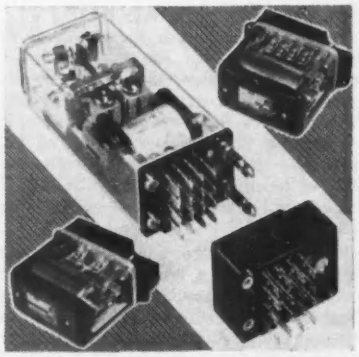
Strain gauge amplifier

AN amplifier designed specifically for the magnification of signals of the order normally received from strain gauges or small thermocouples, the Fenlow type A.3, has a d.c. gain in excess of 2 x 10^5 which is reduced by external feedback resistors. The input impedance is of the order of 2,000 ohms which, for strain gauge applications, is swamped by external resistors. *Fenlow Electronics Ltd., Springfield La, Weybridge.*

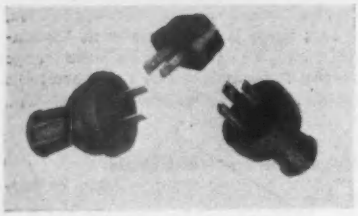
More relays

MANY of the present-day relay developments have resulted from the demands of the aircraft industry. The products themselves are designed for specific performance under stringent conditions which make them suitable for ground based applications as well where comparable conditions may be met. Two high temperature "S" type relays, one rated at 10 A and the other at 25 A, 16-29 V d.c. which have been designed for the Bristol 188 research aircraft are shown here with a Siemens Type 63-69 plug-in type polarised relay housed in a plastics cover. The former are by Plessey and the latter is distributed by B and R Ltd. *Plessey Ltd., Ilford, Essex.*

B and R Relays, Harlow, Essex.



The centre unit is a Siemens polarised relay; the two outer are Plessey high temperature "S" type relays



Metway's American-type plug-tops

Plug-tops are new

THREE American-type plug-tops are now available from Metway. Two of the trio are constructed of rubber and the third of phenol formaldehyde. All three are two-pin flat plugs and one of them is provided with a socket for earthing in compliance with NEMA standards. The other two units have been approved by the Canadian Standards Association. *Metway Electrical Industries Ltd., Canning St, Brighton 7.*

Trunking and troughing

THERE are many designs of trunking on the market, some of which are expensive and complex while others are reasonable in price and simple in concept. Most manufacturers place their faith in metal trunking and, indeed, for the long-term industrial application it is, perhaps, the best choice. There is, however, a place for non-metallic trunking and a very full range of p.v.c. trunking, conduit and fittings is now to be obtained in the "Gilflex" list. Trunking in black p.v.c. with cream cover can be supplied in four sizes from 3 in. by 1½ in. to 4 in. by 4 in. with respective elbows, flat tees, crossovers and bends, etc. Flexible p.v.c. conduits in 50 ft coils from ⅜ in. i.d. to 1¼ in. i.d., rigid p.v.c. conduit in 2½ ft lengths, oval conduit in 10 ft lengths or flexible in 50 ft coils with associated fittings, all at competitive prices are to be found in the company's latest catalogues.

Troughing is another alternative to "looming" where a number of small cables are to be run together with easy access for additions afterwards. Light 18 s.w.g. aluminium troughs, ¾ in. or 1½ in. wide, with simple retaining clips of p.v.c., are ideal for the purpose and are supplied in two lengths, 6 ft long, cartoned with the p.v.c. clips.

Gilflex Conduits Ltd., Upton Rd, Watford, Herts.

Datum Metal Products Ltd., Colne Way Trading Estate, Watford, Herts.

TRADE PUBLICATIONS

A.E.I.—New industrial and floodlighting catalogue other than tubular fluorescent. A.E.I. Lamp and Lighting Co. Ltd., Melton Rd, Leicester.

BELLING.—1961-62 catalogue of domestic heating and cooking appliances. Fully illustrated in colour. Belling Ltd., Bridge Wks, Enfield, Middx.

CROMPTON. — Recently issued illustrated booklet giving details of a.c. motors designed to meet difficult site conditions. Crompton Parkinson Ltd., Crompton Hse, Aldwych, W.C.2.

E.M.I.—New EMIAC II analogue computer leaflet, illustrated and with diagrams. E.M.I. Electronics Ltd., Instrumentation Divn., Hayes, Middx.

G.E.C.—Revised price lists of thermal storage heaters, cookers, and other domestic appliances. Also list for fluorescent lighting fittings. G.E.C. Ltd., Magnet Hse, Kingsway, W.C.2.

J.E.L.—Brochure describing activities and products of the J.E.L. Group of Companies, Green La, Hounslow, Middx.

KENT.—Specification sheets and price lists of low-head instruments, level and pressure instruments and details of after-sales service. Geo. Kent Ltd., Luton, Beds.

LINE EQUIPMENT.—Two pamphlets detailing h.r.c. current limiting fuse links. Line Equipment Ltd., Queen Victoria St, E.C.4.

M.K.—Four-page brochure detailing domestic socket outlets, switches and plugs. M.K. Electric Ltd., Shrubbery Rd, N.9.

Electronic After-baking for Biscuits

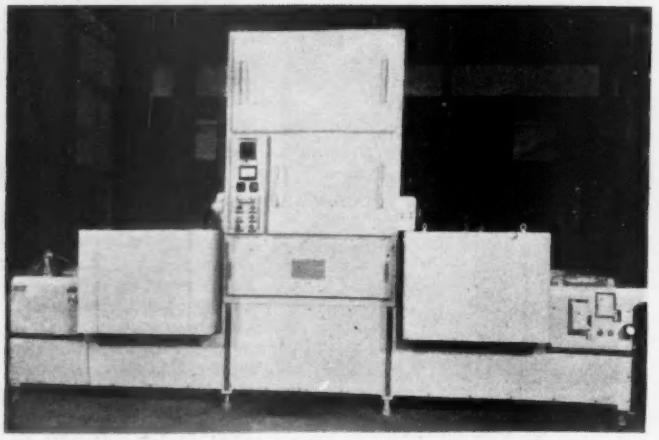
A COMPARATIVELY recent development in biscuit manufacture is "after-baking," using electronic ovens to induce internal heating of the biscuits diathermically immediately after emergence from the normal baking ovens. Most of the development work has been done in this country by Radyne Ltd., of Wokingham, Berks, who have been in close collaboration with the leading biscuit manufacturers. As a result of the successful conclusion to the programme, a number of Radyne after-baking installations have been installed during the past 12 months and others are on order and in manufacture.

Briefly, the objective of the research was to uprate the output of conveyorised baking ovens of conventional type by permitting the biscuits to emerge in a hot, partially baked form and complete the baking by diathermic heating in a second electronic oven located close to the oven outlet. Early experiments attempted to pass the h.f. currents through the biscuits, using the metal conveyor belt as the earth electrode, but it was found that, largely because of the relatively thin form of the biscuits, the risk in localised internal burning, which could not be discerned from outside, was considerable.

By switching the application of the h.f. currents along, instead of across, the biscuits, it was found that selective heating, in areas where the biscuit was under-baked, could be achieved. One point is, however, important; the after-baking must take place while the biscuit is hot from the oven and failure can result if the after-baking oven is located more than a few feet away from the main oven.

In the main oven the outer parts of the biscuit are fully baked but the inner parts are left still moist and under-baked. In passage through the electronic oven, heating is confined to those areas in which the moisture content is high and ceases as soon as it falls. There is practically no heat induced in the dry parts of the biscuit so, no matter how high the heating effect, no burning of the biscuit can result. All that is necessary in the conventional installation is to speed up the conveyor belt and to install the after-baking unit close by. In many cases the after-baking unit enables the output of the main oven to be increased up to the limits of the conveyor belt speed.

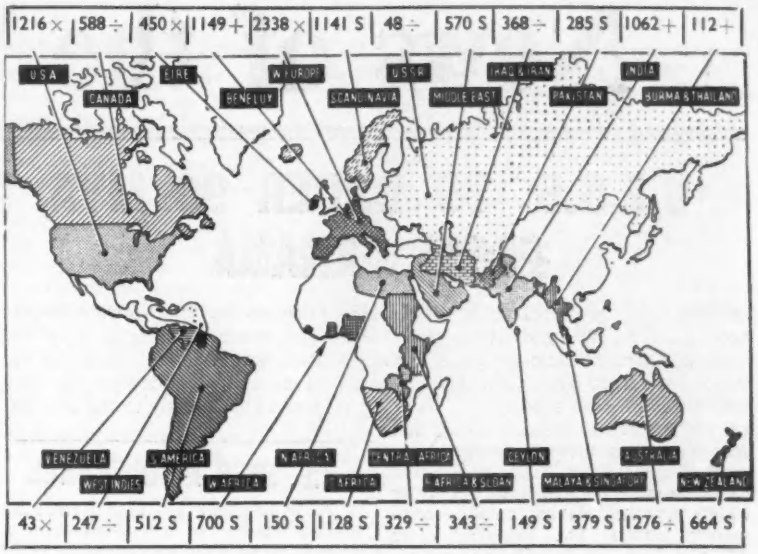
As a result of the experience gained, a new model has been developed which incorporates all of the refinements found necessary and the h.f. oven section height has been reduced to only 4 ft 6 in. by increasing the operating frequency from 36 Mc/s to 60 Mc/s, or even 80 Mc/s. To meet the hot ambient conditions which occur in many bakeries, a water-cooled valve is incorporated and the oscillator is a multiplying cavity type in place of the more usual coil and capacitor. Though the output is only 20 kW, as compared with up to 25 kW in the earlier models, circuit output losses are reduced and the output is as great with about two-thirds of the energy consumption.



General view of the latest model after-baking unit by Radyne

Distribution of Exports in £'000's Sterling

×=over 25% increase
+=10% to 25% increase
S=10%+ to 10%−
−=10% to 25% decrease
÷=over 25% decrease
on previous year's figures



EXPORTS IMPORTS *September*

ANOTHER £1 million drop in electrical exports occurred in September, the total of £19,073,602 for that month being only some £800,000 up on a year ago, when delays in shipments were taking place because of the tally clerks' strike at the Port of London. The total is, therefore, the lowest of the year so far. Most of the £1 million decline compared with the previous month concerned the heavy plant side of the industry, yet the appliance manufacturers showed a slight improvement. Washing machines in particular made a big jump, and even refrigerator exports were a little higher than in August, but lighting fittings firms suffered a setback.

Australia was our best customer for the month, taking goods to a total value of £1,276,034, of which £236,231 related to generators and motors, £170,761 for converters, rectifiers, transformers and switchgear, and £97,872 for cables. The high total of £1,216,052 taken by the USA included generators and motors worth £488,902, converters, rectifiers, transformers and switchgear to a value of £117,986, and £246,867 for radio and electronic equipment.

On the import side, the total value of £5,183,102, while being the lowest since last February, showed sizeable increases over the previous month for domestic appliances, particularly the portable motor-driven type, and for lighting fittings. Imports from the USA alone amounted to £1,498,968.

Description	Exports Value (£)		Imports Value (£)	
	Sept. 1960	Sept. 1961	Sept. 1960	Sept. 1961
Generators				
Diesel up to 200 kW	299,310	271,045		
Diesel over 200 kW	168,458	170,025		
Steam turbine driven	36,977	—		
Water and gas turbines	368,967	618,921	106,685	141,095
With i.c. and other prime movers	9,064	89,664		
Generators up to 200 kW	69,430	75,688		
Generators over 200 kW	9,277	35,089		
Generator parts	207,863	675,924		
Motors, f.h.p.	278,674	249,476		
Motors 1-250 h.p.	375,088	360,583	209,717	200,473
Other motors	287,195	286,437		
Motor starters and controllers	246,146	294,570		
Converters and rectifiers	45,348	43,945	199,654	159,259
Transformers	867,050	420,277		
Switchgear, to 200 A, mv	383,010	279,411	130,229	160,336
Switchgear, other	1,012,831	904,413		
Total, Electrical Plant	*4,664,688*	*4,775,468*	*646,285*	*661,163*
Batteries, primary and parts	727,015	565,491		
Lamps, filament, over 28 V	93,435	90,442		
Lamps, filament, under 28 V	26,457	30,568	100,424	126,464
Fluorescent tubular lamps	71,319	78,921		
Other lamps and parts	65,712	90,419		
Radio and electronic gear	3,424,213	3,705,623	1,576,229	1,379,319
Telephone and telegraphic equipment	1,094,518	1,672,149	47,211	67,265
Cookers	45,189	32,216		
Other cooking appliances and parts	110,574	124,397	196,981	198,004
Space heaters	29,259	34,045		
Water heaters	26,467	39,502		
Other heaters and parts	107,605	171,728		
Electric irons	67,884	57,826		
Vacuum cleaners	212,262	215,200		
Floor polishers	39,326	31,762	189,105	270,699
Food mixers	58,824	118,630		
Washing machines, domestic	503,590	755,163	159,121	87,994
Dryers	20,376	27,250		
Washing machine and dryer parts	122,702	126,636		
Domestic refrigerators and parts	722,021	404,782	253,653	82,765
Other appliances and parts	308,516	314,599		
Total, Domestic Appliances	*2,280,452*	*2,336,142*	*798,860*	*639,462*
Portable power tools	228,270	273,440		
Arc welding plant	71,058	68,355	53,874	64,061
Resistance welding plant	40,143	29,001		
Electric furnaces	118,613	92,742		
Signalling apparatus	126,509	105,107		
Commercial instruments	172,354	195,880	100,966	90,492
House service meters	128,574	156,196		
Wiring accessories	181,190	207,095		
Fans	90,494	82,242		
Lighting fittings and lanterns	319,954	283,381	188,982	234,741
Other lighting equipment	88,035	67,010		
Telephone and telegraph cable	198,484	279,936		
Paper insulated cables	442,452	365,562		
Rubber insulated cables	296,330	174,993		
Thermoplastic insulated cables	223,557	318,873		
Winding and similar wires	134,847	105,689		
Other cables and wires	143,708	144,512		
Total, all cables and wires	*1,439,378*	*1,389,565*		
Accumulators and parts	332,125	386,920		
Insulating materials	170,205	195,502		
Industrial electronic control gear	220,068	254,256	51,481	96,659
Electrical ware	63,716	99,409		
Permanent magnets	68,627	49,180		
All other articles	2,640,845	2,475,504	1,426,941	1,896,441
Total	19,042,110	19,873,602	5,183,102	5,476,318

News of the Week

C.E.G.B. TO ORDER 90 MVA TRANSFORMERS FROM CANADA

APPROVAL has been given by the CEGB to the purchase of two transformers from Canada. We understand that a letter of intent is being sent to the Canadian General Electric Co. on behalf of the South Western Region of the Board for two 90 MVA, 132/33 kV units. This, no doubt, arises from the view that prices of large transformers have not responded sufficiently to the decision of the Restrictive Practices Court last March rejecting the transformer agreement. On the other hand, transformer prices recently have slumped heavily in North America, making possible competitive tenders. The Canadian order will also have the benefit of Commonwealth preference. It seems unlikely that this single order will lead to any serious repercussions; it remains to be seen how far the CEGB will pursue this policy.

Nuclear Society Formed

AS from next January, the British Nuclear Energy Society is to succeed the British Nuclear Energy Conference (which has been operating since 1955). To ensure continuity, for the first year the affairs of the Society will be managed by the present board of the conference, but thereafter the board will include members elected by and from the general membership of the Society. The Institution of Civil Engineers has offered its Westminster premises as a meeting place, and a regular programme of papers, lectures, etc., is being prepared.

E.E. STEP INTO FRANCE

A NEW company has been formed by English Electric in partnership with a French firm, Les Exploitations Electriques et Industrielles, to manufacture and sell all types of electric and electronic control equipment for France and the other Common Market countries. The name of the new company is La Compagnie Continentale d'Equipements Electriques (CEE), whose capital of NF 5 million will be shared equally.

Consent for Eggborough

THE CEGB have this week received consent from the MoP for the second of two 2,000 MW stations to be built in the West Riding of Yorkshire. This is at Eggborough, five miles downstream on the River Aire from the other station, Ferrybridge C, approved in August.

Both stations will have four 500 MW sets, fed by four 3,450 klb/hr boilers, with identical steam conditions of 2,300 lb/sq in., 1,050°F. Each will burn about five million tons of coal a year.

The commissioning schedule of Eggborough will run about a year behind that of Ferrybridge C. Work on the Eggborough site is expected to start early next year, the first set is due to be commissioned in 1966, and completion is scheduled for 1968.

G.E.C. Shift Control of Witton and Erith Works

. . . and expand in France

IN accordance with their new policy of forming their manufacturing groups into subsidiary companies, GEC have created GEC (Engineering) Ltd. to take over and develop the group's engineering activities. The manufacturing resources of this new subsidiary comprise the electrical engineering works at Witton, Birmingham, and the mechanical engineering works at Erith, Kent. Between them, these two plants have more than 15,000 employees.

The board of directors of GEC (Engineering) Ltd. will operate from headquarters in central London yet to be acquired. Negotiations for suitable premises are under way, a spokesman for the group reports. Details of appointments to the board of the new company appear on page 612.

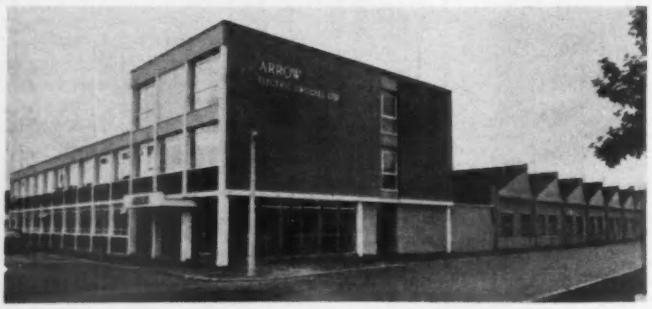
Lamps in France

WITH Britain's entry into the Common Market looking more and more likely, GEC have increased their stake in Adès Frères to a controlling interest and changed the name to Lampe GEC de France SA. Adès Frères is the small French lamp manufacturing concern in which GEC had taken a financial interest, as referred to by Mr A. L. G. Lindley at the annual meeting last month.

The Paris factory of the new subsidiary will be directed by GEC's Osram undertaking in the UK, but under the agreement with German Osram GEC cannot use the Osram brand on the Continent. Instead, they will trade under the title "Lampe Adès."

FIVE ACRE HOME FOR ARROW

ARROW ELECTRIC SWITCHES LTD. officially launched their new 200,000 sq ft factory at a cocktail party at Southall last night. Growth of the company since incorporation in 1932 has been such that never more than a few years have elapsed before expansion was necessary. This has culminated in the new Southall plant, which replaces the former premises at Hanger La, Ealing, and at Uxbridge Industrial Estate. Welcoming the guests, the managing director, Mr T. S. Crabtree, said how happy he was to have present Mr G. B. Seawright, who first came over to the UK in 1929 on behalf of the parent company, Arrow-Hart and Hegeman Electric Co., of Hartford, Connecticut. Mr Seawright, who returned to the US in 1950, formally declared the premises open.



These new works at Southall are now producing Arrow controls

OIL-FIRED SET FOR SCOTLAND

BECAUSE of further delays now expected before the Glen Nevis hydro-electric scheme can be approved or rejected by the Secretary of State for Scotland, the N of S HEB is to bring forward a plan for a 120 MW oil-fired steam set at Dundee. This was announced in a written Parliamentary reply on Monday.

Some of the objectors to the Glen Nevis scheme now say that they cannot put forward their views on amenity until the Mackenzie Committee, now considering the general question of electricity in Scotland, has reported—their report is not now expected until the middle of 1962. The Secretary of State has in consequence decided that the necessary public inquiry must be deferred until after that date.

The Glen Nevis scheme might have been in full operation by 1965-66 if normal procedures had been followed. The Secretary of State has agreed to the Board proceeding with preparation of other hydro schemes to safeguard the 1966-67 position, but no order confirming a scheme will be presented to Parliament until the Committee reports.

Oldbury Contract for N.P.G.?

IS the Nuclear Power Group to get the contract for the 550 MW Oldbury-on-Severn nuclear power station? It is being suggested as likely, with the news that the CEGB has sent a questionnaire to the Group concerning its tender for the project. In previous instances this latter action has resulted in the award of the contract to the group concerned, but it must not be taken as a definite indication.

The Nuclear Power Group's tender proposed the use of a thick reinforced concrete vessel to house the pressurised coolant gas instead of 4½ in. thick steel.

Rise for P.O. Engineers

PAY increases ranging from £43 to £64 a year for salaried grades, and from 11s 6d to 17s 6d a week for others, have been awarded to some 75,000 Post Office engineering staff. The increase represents a 7½% rise for engineering grades and 6½% for labourers and some ancillary grades. The awards by the Arbitrational Tribunal were back-dated to 1 Jan., 1961, but because of the Government's "pay pause" the Post Office is not to pay anything in excess of its offer of a 5½% increase until the ban is lifted. The higher rates will eventually be paid, but with no retrospection for the difference between them and the 5½% advance.

Claimed to be the largest reinforced plastics structure yet made in Europe, this ground radome has been made by English Electric's Reinforced Plastics Division for the protection of defence radar equipment. Nearly 70 ft dia. and over 50 ft high, it consists of some 300 panels bolted together. The idea may have many other applications, and designs for domes over 100 ft dia. are being investigated

AUTOMATIC CONTROL TO AVOID CASCADE TRIPPING

HIGH-SPEED reorganisation of power system connections to avoid cascade tripping is the object of an automatic controller under investigation at Imperial College, University of London. It is described in a recently published research report of the City and Guilds College, the engineering section of IC.

The automatic controller applies the principle of "integrated protection." It is based on a study of the system to be controlled, to determine how it can operate satisfactorily under the many different conditions that are likely to occur in practice. If part of the system is removed from service due to overload, the controller causes automatic operation of circuit-breakers, tap changers and voltage regulators to maintain system security.

In the model power system at the College, the time for operation when a line or generator is removed on overload is about 5 millisec, fast enough to ensure that cascade tripping will not occur. For operating a large power network, a digital computer would be necessary to give the required speed and capacity.

Research at the College is also concerned with behaviour of individual generators, through the use of "micro-reseaux." In connection with the model machines, a voltage regulator simulator is available. Recently, attention has been given to calculating the damping effects of eddy currents in the rotor iron of a turbo-generator, and results of tests on 30 MW and 60 MW CEGB generators are being compared with more detailed tests on model machines in the laboratory. The tests were made with the generators running out of synchronisation for an appreciable time.

Electrical machine studies in hand at the College include investigation into ways of maximising the energy content of short-time current pulses obtained from alternators. Performance of variable speed motors based on controlled silicon rectifiers is being analysed, and heating, mechanical force and other effects in machine end windings is being investigated.

Also described in the research report is the College's research work in the fields of light current electrical engineering and electrical engineering materials.

CONTRACTOR TO FLOAT

F. H. WHEELER AND CO. LTD., electrical contracting subsidiary of KG (Holdings) Ltd., is to be hived off as a separate company with a stock exchange quotation soon. This is disclosed by Mr P. R. V. Wheeler, KG chairman, in the annual report.

OFFER TO MANUAL WORKERS NEXT APRIL

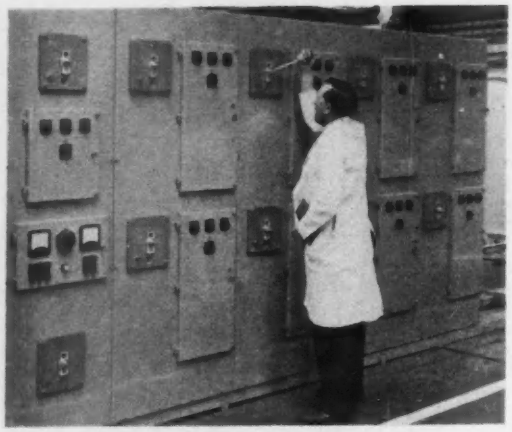
THE £2 a week pay increase claim on behalf of manual workers in the Electricity Supply Industry was flatly rejected by the Electricity Council last week, "in view of the economic position of the country." But the employers' side sugar-coated the pill with an offer of a 2½% rise from 1 April next to all employees with over five years' service, and to negotiate increases for others to operate "after the present national economic difficulties have been surmounted." There was a lengthy debate on these offers, and the joint negotiating committee meets again today, 26 Oct, to consider the matter.

At last week's meeting, Mr C. T. Melling, deputy chairman of the Electricity Council, for the employers' side, indicated that they were prepared to improve the earnings of experienced manual workers, and enhance their status in the industry, because they tended to lose such men to engineering and electrical contracting companies.

Rewiring Mersey Tunnel

WIRING in the Mersey Tunnel, which has been in use since the tunnel was first opened 30 years ago, is to be renewed as part of a £500,000 improvement scheme.

The major task of relighting the tunnel was completed last year, but much of the electrical equipment now in use is outdated and ageing. Renewal of cabling and switchgear is an expenditure forced on the administrators. Mersey Tunnel Joint Committee, by time.



Board for West Thurrock

Part of a £250,000 contract for an installation at West Thurrock, this motor control board, is being inspected at the Monmouthshire works of South Wales Switchgear Ltd., prior to dispatch. Installation has begun of the first series of 30 major 415 V switchboards, together with control and distribution boards

POWER STATIONS AFFECT THAMES POLLUTION

COOLING water discharged from Thames-side power stations will add heat to the river at a rate of 300,000 million B.Th.U./day by 1965, says the Pippard report, "Pollution of the Tidal Thames." It will raise the temperature of the river at London Bridge by about 1·8°C, but the effect is lessening. It was 4·6°C in 1956. London Bridge is the hottest point at present.

The Pippard Committee has been investigating the effect of all sorts of effluents discharged into the Thames, and its report has been published after ten years' work. It finds that three-quarters of the heat added to the Thames in the tidal section comes from power-station cooling water. In more familiar electrical units, the rate of heat input quoted above is 88 million kWh/day.

Despite this high figure, the report says that heated discharges have been shown as not having such an important effect on the condition of the Thames as had been thought.

As power stations are built farther down the river, the mixing of larger quantities of sea water with the cooling-water discharge reduces the temperature rise. It is estimated that by 1965 the river will be hottest (2° above its natural temperature) in a stretch below London Bridge. By 1970, it is estimated by the CEGB that the amount of heat discharged into the river will be reduced by one-quarter.

Increase of temperature affects the quality of the river water in a complex manner, and it can be reduced by adding oxygen to the water by aerating discharges into the river. So far as power stations are concerned, this is a process which introduces technical problems, as the syphon in the cooling-water system has to be broken. The Pippard report, none the less, suggests that "the CEGB, as one of the most important river users, should be asked to consider the practicability of aerating the cooling water at power stations in the worst polluted parts of the estuary."

Would Common Market mean cheap coal for N.I.?

IF Britain's negotiations to join the Common Market went through, it might be possible for Northern Ireland to obtain continental coal more cheaply than that produced in Gt. Britain, and this could introduce a new factor in future power supplies. That point was made by Mr Richard Wood, Minister of Power, in Belfast last week. He advised local business men to await the result of the negotiations before making any long-term decisions about the source of power they would use.

It might be possible to develop a nuclear power station suitable for Ulster, but this was a matter for the Electricity Board of Northern Ireland and the Government. Experience in Britain had shown that the larger the nuclear station the more economical it was; but, of course, the demand for electrical energy had to be correspondingly greater.

Asked if a link with the Eire power system might make a nuclear power station in Northern Ireland more economical, he said he did not know whether the advantages of any interchange of energy would be so great as to overcome any other difficulties there might be.

Area board review

IN the review of area board performance, published in our issue of 5 Oct., a histogram was published of the number of units sold per domestic consumer. Unfortunately, the figure for the Eastern Board was incorrectly drawn as 2,958 whereas it should have been 2,598. Thus, the Eastern Board has the third place in sale of units per domestic consumer, not first place.

BOLD "A" SET REBUILT AFTER EXPLOSION

ALTHOUGH earlier regarded as a "write-off" after the explosion nearly a year ago, the No. 2 32 MW turbo-alternator at Bold "A" power station, North Western Region, CEGB, has been reconstructed by AEI and the set is now expected to be recommissioned by the end of the year.

The explosion occurred on 3 Nov. last, when the l.p. rotor of the machine disintegrated, but fortunately none of the station staff were injured by the pieces of metal which flew in all directions. Cause of the trouble, we are told, was overspeeding due to failure of the steam inlet valve to close in an emergency. The cost of reconstruction of the machine is being borne by the CEGB.

Bold "A" power station has three other similar machines, also of AEI manufacture, in operation, which have been uprated from 30 MW to 32 MW.

Instrument Co. in Italy

ANOTHER company to put a foot in the door of the Common Market is Cambridge Instrument Co. They have made an agreement with Instrumenti di Misura CGS of Milan for the formation of a joint company to manufacture instruments in Italy.

OFFICIAL PUBLICATIONS

BS 15. Mild Steel for General Structural Purposes, 5s.

BS 78. Cast-iron Spigot and Socket Pipes (Vertically cast) and Spigot and Socket Fittings. Part 1. Pipes, 5s.

BS 196. Protected-type Non-reversible Plugs, Socket-outlet, Cable-couplers and Appliance Couplers with Earthing Contacts, for Single-phase a.c. up to 250 V, 15s.

BS 1615. Anodic Oxidation Coatings on Aluminium, 7s 6d.

BS 3456. Domestic Electrical Appliances. Part A. Heating and Cooking Appliances. Section A1. General Requirements, 8s 6d.

National Advisory Council on the Training and Supply of Teachers for Further Education. Report of sub-committee. HMSO, 1s 3d.

Better Office Lighting. British Lighting Council, 6s (see page 600).

Pollution of the Tidal Thames. Report of Departmental Committee on Effects of Heated and Other Effluents and Discharges on the Condition of the Tidal Reaches of the Thames. HMSO, 5s 6d (see this page).

Electric Energy Statistics for Europe. UN Annual Bulletin, 1960. HMSO, 7s.

Organisation of Electric Power Services in Europe. Addendum to second edition. UN Report. HMSO, 2s 6d.

Geographical Distribution of Gross Surface Hydro-Electric Potential in Europe. UN report. HMSO, 2s 6d.

Marine Exhibition Turns International

Both Olympia and Earls Court booked for 1963

FILLING the gap in London's exhibition curriculum, the biennial Engineering, Marine, Welding and Nuclear Energy Exhibition is being expanded into a more general engineering exhibition on an international scale. Named the London International Engineering Exhibition, it will occupy the million sq ft of Olympia and Earls Court combined, from 23 April to 2 May, 1963. As things stand, this will be the first opportunity for foreign manufacturers of many types of plant to display their wares alongside their British counterparts in this country.

Particularly timely in view of the trend towards greater integration with Europe, the new exhibition will overlap the Hanover Fair, so that overseas visitors may cover the two in one short visit to Europe.

More electrical equipment will be shown than at the precedent "Marine Exhibition." Hitherto, this exhibition concentrated on the heavier plant, and the heaviest will still be shown at Olympia but, in addition, Earls Court will be largely devoted to electrical engineering products, together with some of the lighter general engineering goods.

In its new form, the exhibition will cater for every type of engineering product from the largest items of capital equipment to the smallest power tools and components. As a result, the element of overlapping with the Electrical Engineers' Exhibition, which will take place at Earls Court a month earlier, will be increased, but the two exhibitions will remain distinct in character.

To present the new exhibition, F. W. Bridges and Sons, organisers of the Engineering, Marine, Welding and Nuclear Energy Exhibition since its inception in 1906, have been joined by Industrial and Trade Fairs Ltd., the *Financial Times* subsidiary which organised the British Fair in Moscow. The venture will be backed, say the sponsors, by the largest publicity campaign ever launched in support of an international exhibition held in London. It is hoped that some 1,200 exhibitors will take part.

E.E. Appliance Service H.Q.

HEADQUARTERS of English Electric's Domestic Appliance Service Department moves on 1 Nov. from East Lancashire Rd, Liverpool, to new and larger premises at Wilson Rd, Huyton, Lancs. Telephone Huyton 6211.

E.C.A. and R.T.R.A. urged to co-operate on selling

THE Electrical Contractors' Association and the Radio and Television Retailers' Association should become more closely knit together. That view was expressed by Mr D. M. Keegan, director of the RTRA, at the annual dinner of the Colchester branch of the ECA last week. He pointed out that the two associations had a great deal in common and suggested that they could discuss more openly and freely the many problems affecting each of them. Replying, Mr C. J. Veness, ECA, vice-president, said the contractors were anxious to work with the retailers, wholesalers and manufacturers.

TAKEOVER NEWS

WITHIN the week, Firth Cleveland have confirmed rumours that they would sell their controlling interest in Solartron Electronic Group to an overseas company, and the Treasury have given consent to the £1·9 million deal. The purchaser is revealed as being Schlumberger Ltd., of the US, who are paying 85s a share for Firth Cleveland's 56·7% interest, compared with the 60s which Firth Cleveland paid a couple of years ago.

Dr J. E. Bolton, chairman and managing director of Solartron, will continue in that position, it is understood, and he and his fellow-directors are retaining their shareholdings.

Schlumberger is an international organisation giving technical services to the oil industry. It has recently agreed to merge with Daystrom Inc., a large US manufacturer of electronic equipment.

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THE makers of Hydriver, Hycaddy, Hydrum and Hybin electric trucks, R. H. Corbett and Co. Ltd., of Rochester, Kent, have been taken over by Montgomerie Reid Engineering Co. Ltd. Montgomerie Reid will continue to manufacture and market Corbett's complete range. A proportion of the existing orders will continue to be manufactured at Rochester, but this will be rapidly absorbed by the large-scale extensions which are being carried out at Montgomerie Reid's works at Bramley Green, near Basingstoke.

There will be no alteration in the names or prices of the trucks, but DP Kathanode traction batteries, which are standard equipment on all Montgomerie Reid models, will now be fitted to the Corbett range, where applicable.

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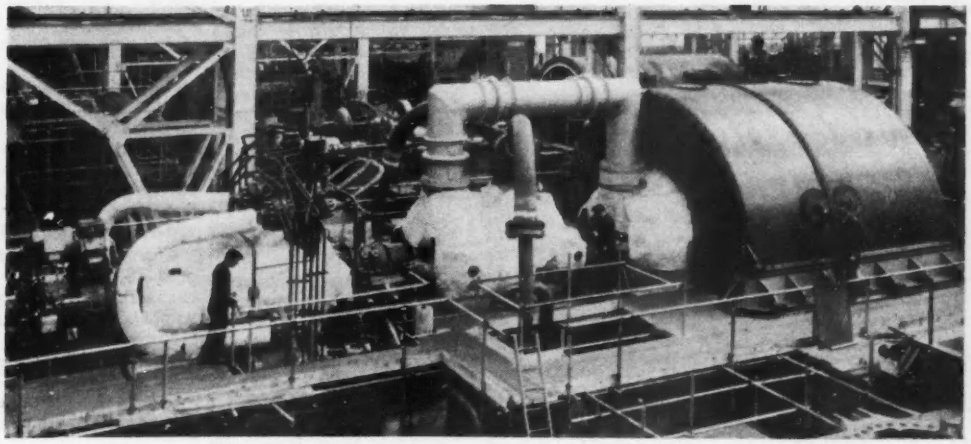
AS was expected, the merger proposals of Bruce Peebles and Co. Ltd. and The Belmos Co. Ltd. have succeeded. Considerable economies are expected from the amalgamation, and shareholders of both companies approved the terms at meetings last week. Peebles share certificates will be posted to the Belmos shareholders on 1 Nov., and dealing in the new shares has already been authorised.

FIRST SET for RICHBOROUGH



The first of three 120 MW turbo-alternators being built by Richardsons Westgarth (Hartlepool) Ltd. for Richborough power station, on completion of shop steaming trials

£350 FINES ON C.E.G.B. FOR TWO ACCIDENTS

FINES totalling £350 were imposed on the CEGB at Birmingham Magistrates' Court last week on summonses arising from two accidents, one of them fatal, at Nechells power station earlier this year. The Board was fined £250 for failing to make a switchboard dead before maintenance work was started, as a result of which a workman was killed in July. The other fine of £100 was for failing to protect a live conductor, from which another workman received serious burns last April.

Entering pleas of "Guilty" in each case, Mr D. Roberts, for the CEGB, said steps had since been taken to ensure that the accidents could not happen again. Nechells had always had a good safety record and had won the divisional trophy in the safety competition last year.

For the prosecution, it was stated that in the fatal accident engineers were to inspect an 11 kV circuit-breaker in a switch-house. The live circuit was isolated, but unknown to them, apparently, there was another live circuit in the same cubicle, but on a higher level. This was not indicated on the door of the cubicle, in which the deceased was instructed to clean the insulators.

Other electricians had made dead the circuit on which they intended to work, but failed to realise the other was still live. The deceased had worked there for 16 years and apparently he also did not know.

The other accident happened when the workman, apparently reaching through a hole for a bottle of linseed oil, came into contact with a conductor which should have been protected.

Increasing Teaching Staff

THE target figure of 18,600 full-time technical college teachers by 1961 has been reached and passed, but judged by trends in recent years that number will have to be increased to about 27,000 by 1963-64, and to 37,000 by 1970. These figures are taken from the report of the National Advisory Council "Teachers for Further Education," published by HMSO last week.

To achieve the 1970 total, the average recruitment rate, allowing for wastage through retirements and other reasons, will need to be stepped up to some 3,600 annually, compared with 3,000 in 1959-60.

LARGE CONTRACTS AWARDED

A CONTRACT worth over £500,000 for electric motors and control gear for use in connection with the manufacture of polythene, by a group of four eastern European countries, has been placed with Laurence, Scott and Electromotors Ltd. Know-how on the manufacture of polythene by the high-pressure system will be provided by ICI Ltd. and Simon-Carves Ltd. The electrical equipment includes large N-S variable-speed a.c. motors for compressor drives to a total of over 20,000 h.p., and nearly 300 flameproof induction motors, in sizes up to 165 h.p. for auxiliary drives, together with associated control gear.

AN order for two 90 MVA, 132/33 kV transformers, worth over £150,000, for Meaford substation has been awarded to the AEI Transformer Division by the CEGB. High-speed resistor-transition on-load tap changers will be fitted.

MARCONI'S Wireless Telegraph Co. are to supply a twin path VHF multi-channel radio telephone system to Ghana to link the Volta dam area with Accra.

Higher Education: F.B.I's Views

A PLEA that colleges of advanced technology should undertake research in association with industry rather than conduct basic research on their own is made by the Federation of British Industries' Education Committee in evidence to the Robbins Committee on Higher Education.

The FBI contend that there is a growing and unsatisfied demand for young men and women in industry capable of forming judgments on complex matters. With this in view they consider that a larger percentage of school-leavers would benefit from some form of higher education. They feel that in so far as university and equivalent courses are concerned, there is a need not only for longer degree courses in certain fields but also the introduction of new forms of general degree. These would provide high calibre candidates with a course of study which adequately extends their capacity. Extensions to university courses would take the form of a first degree course followed by employment in industry, then a second period of study leading to a more specialised knowledge of a particular technology.

With the growth of new technologies, industry can be expected to provide a small but steady demand for many types of full-time post-graduate courses. However, the FBI feel that for certain specialised studies there are too few industrial students throughout the country to warrant more than one course Accordingly, they suggest a central clearing house for all post-graduate courses offered by institutions of higher education. This might be run in consultation with industry and the DSIR.

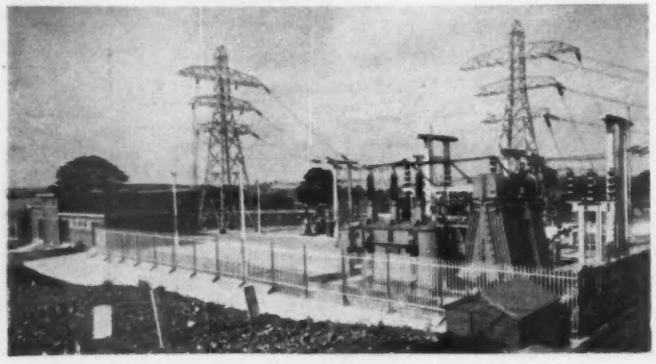
Changing patterns of higher education need to be matched by corresponding changes in the supply of teachers. To combat possible shortage, the FBI recommend that the manufacturing industry should be encouraged to help meet these needs by short- as well as relatively long-term secondment of staff for teaching purposes.

ANOTHER YORKSHIRE SUBSTATION

THIS month has seen the opening of yet another substation by Yorkshire EB. On this occasion it is a 132/33 kV grid supply point at Wold Newton to meet the higher demand in the mainly rural areas on the southern side of Grimsby, Lincs. As part of the scheme, the 22 kV substation at Louth has been upgraded to 33 kV, and a similar substation has been constructed at Walesby.

The opening of Wold Newton grid supply point was performed by Councillor R. C. L. Fitzwilliams, chairman of Grimsby Rural District Council, on 4 Oct.

With an initial capacity of 59 MVA, Wold Newton derives its supply from the national grid by means of two incoming 132 kV lines. One of these lines is connected direct to Lincoln power station and the other is connected to Keadby power station via Grimsby. A direct Keadby - Wold Newton 132 kV line, designed for double circuit operation, is being constructed for commissioning next year. The second circuit will be connected in 1963.



Wold Newton's transformers and 132 kV switchgear in the outdoor compound

PERMALI FACTORY IN INDIA NEXT YEAR

PRODUCTION by the new £127,000 Permali factory in India is expected to commence in a year's time. An initial annual turnover of £250,000 is envisaged. Final arrangements for the factory, at Bhopal, have now been completed. The outcome of collaboration between Permali Ltd. and Chas. Lowe and Co. Ltd., with the Indian Plywood Manufacturing Co. and the Wallace Flour Mills Co. Ltd., of Bombay, the plant will manufacture a full range of densified wood laminates, using indigenous materials as far as possible.

The directors of the new company, Permali-Wallace Ltd., are: (British) Mr A. A. Heath and Mr R. W. Lowe; (India) Mr J. V. Kanji (chairman), Mr N. V. Kanji, Mr K. S. Lanly and Mr C. K. Vissanji. Mr R. Ely, of Permali Ltd., has been appointed resident engineer and liaison officer in India.

Bagnall Reorganisation

EMPLOYEES of W. G. Bagnall Ltd. (who recently joined the English Electric group) are to be transferred to EE employment, and Bagnall's Castle works at Stafford will come under the administration of the general manager, English Electric, Stafford. Under the reorganisation, W. G. Bagnall becomes a subsidiary of Vulcan Foundry Ltd., the principal locomotive manufacturer of the EE group. Bagnall's sales management will continue to operate from the London office at 1 Hay Hill, W.1.

Birmingham Club Dinner

HIGH tributes were paid to Mr W. S. Lewis, C.B.E., J.P., at the annual dinner of the Birmingham Electric Club last Friday. The tributes were both in regard to his service as chairman of the Midlands Electricity Board from 1948 (from which he retires at the end of December) and for his long and devoted service to the city of Birmingham itself.

Sayings OF THE WEEK

"There are so many safety devices, ready to bring about a shut-down of the chain reaction, that it is a wonder the thing works." . . . MR T. TUOHY, works general manager, referring to Calder Hall nuclear power plant, on completion of five years' operation.

"There are still a lot of people we would like to see turn into greengrocers, dentists or anything else but electrical contractors. They did not know their job." . . . BRIG W. G. S. THOMPSON, at annual dinner of Colchester branch, ECA.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, October 24

	£ per ton	Weekly change £
COPPER, standard class A (settlement) ...	229	−1
" (3 months)	229½	−1½
LEAD, refined pig, 99·97% purity (cash)	62	−1½
" (3 months)	63½	−1½
TIN, refined, min. 99·75% purity (settlement)	944	+7
(3 months)	949	+3
ALUMINIUM, ingots 99·99·5% ...	186	—
" wire bars (4×4×54")	193½	—
BRASS Strip 63/37	198½	—
SILVER (Troy oz)	80d	+½d

	£ per ton	Weekly change £
ZINC, virgin, min. 98% purity (cash)	71½	−1½
" (3 months)	72½	−½
RUBBER, per lb No. 1, RSS, spot	24½d	−½d
c.i.f. basis, ports, Dec. ...	24d	−$\frac{7}{16}$d
ARMOURING: Galv. Steel Wire (0·104 in.) ...	68½	—
Mild Steel Tape (0·04 in.) ...	53½*	—
NICKEL (home)	660	—
MERCURY (76 lb flask)	60	−2
AMERICAN PRICES: Copper, electrolytic (per lb) ...	31c	—
Lead (New York)	11c	—

* *Tape Price, now an average, includes varnishing*

KITE CLAIM REJECTED

THE claim for damages by Mr O. Moyle against the Southern Electricity Board, arising from an accident when his kite was blown into a 33 kV transmission line, was dismissed in the High Court on Tuesday. While expressing sympathy with Mr Moyle concerning the injuries which he suffered in the accident (his right arm had to be amputated below the elbow), Mr Justice Stevenson rejected the content that the Board failed to warn the plaintiff of the presence of the cable. For the plaintiff it was also contended that a tripping device which should have cut off the current when the kite hit the cable, was not properly maintained. The Board denied negligence but also expressed sympathy for the plaintiff.

Line Objections

ROUTE of the proposed 400 kV line from Lydd to Bolney, East Sussex, is to be the subject of a public inquiry to be held at Lewes, commencing on 31 Oct.

OPPOSITION to the CEGB's proposed transmission line from Trawsfynydd to the Bangor area of North Wales has been expressed by Portmadoc UDC. It is proposed that the line be underground across the Glaslyn estuary and emerge between Portmadoc and Tremadoc to be carried on steel towers. The Council's works committee consider that these towers would obstruct views of woodland beauty spots, Tremadoc, and other parts of the valley.

E.T.U. results soon?

RESULTS of the election of the new executive council of the ETU are now expected to be announced within the next few days—only a short time before the union's Rules Revision Conference next month. The unfortunate illness of Mr J. T. Byrne, the general secretary, must have some bearing on the delay—he is one of the election scrutineers; and while there have been widespread reports that the election will show a major turnabout, there are also indications that the Communist faction is planning to strengthen their own position. For instance, a proposed amendment to the union rules, tabled for that conference, would remove the election of full-time union officials from a ballot of membership, and transfer it to the delegates at the annual policy conference.

INDUCTION FURNACE

IN our report of the paper on induction furnaces by Mr R. O. L. Clarke (Industrial Electricity, Oct. 19) the photograph of the channel-type induction furnace on page 569 was attributed to Calamari and Metalectric Furnaces. We now understand that this is incorrect, though as stated in the paper. The furnace is a Type DNF (Demag) 500 111 manufactured by GWB Furnaces Ltd. to a Demag design. The particular unit is for melting 70/30 brass and is installed at the works of Earle Bourne and Co.

News in Brief

Thermodare (Great Britain) Ltd. point out that they are not in any way associated with any organisation selling whole-house heating schemes by door-to-door methods.

"New Developments in the Use of Solar Energy" is to be the subject of a lecture by Dr H. Heywood at the Royal Society of Arts on 9 Nov., at 5.15 p.m.

Lucas Industrial Equipment Ltd. will hold a demonstration of their heat pumps at the Old Electricity Showrooms, St. James St, Burnley, from 1 Nov. to 7 Nov. Admission is by ticket only.

The Yorkshire Electricity Board has given notice that it is proposed to standardise the supply voltage in a part of the Borough of Leeds.

At the annual luncheon of the North Western branch, ETCTA, a collection for the EIBA realised £40.

The British Scientific Instrument Research Association has published a research report, "D.C./A.C. Converters for D.C. Amplifiers," by E. Komolibus, price £2 2s.

Company Activities

AFTER the deluge, which put the leading equity index down to a two-year low of 284·7 against the all-time "high" of 365·7 only five-and-a-half months ago, the sun last week decided, albeit weakly, to shine once more on Throgmorton St. It was generally reckoned that the *Financial Times* industrial ordinary index would not break ground through the 280·0 level and with now pretty well the worst known on the economic situation—October has been one of the gloomiest months for company, industrial and trade news in a very long while—stock market feeling is that at current levels quite a number of share-buying opportunities present themselves. And so it was that the *F.T.* index managed to finish the week slightly brighter at 291.

Electrical shares, too, after their recent retreat, took on a rosier hue. AEI starting out at 29s dipped to 28s 6d but then climbed back strongly to 30s 6d, while English Electric from 26s 3d finished up at 28s 9d. GEC also brightened from 24s 3d to 25s 3d where sentiment was helped by the news that the company has taken a controlling 51% interest in Adès Frères, one of the smaller French lamp-making businesses. The name of the French company is to be changed to Lampes GEC de France and GEC's off-shoot "Caram" will direct production at the Paris factory. Thus another beacon for Britain is lit along the Common Market road.

Elsewhere, Elliott-Automation put on 1s 3d at 35s 3d and EMI edged 9d ahead at 31s 3d while Dimplex recovered from 83s to 84s 10½d. Not so hot, however, were the 5s Ordinary shares of Berry's Electric Magicoal, which cooled from 58s to 56s 6d, and Thorn Electrical, which dimmed from 58s to 57s.

Company news was not lacking last week on the electrical front and among the most notable items were the yearly comments of Mr C. O. Stanley, chairman of the Pye-E. K. Cole merger group, British Electronic Industries. After slating the Government for its "Stop-Go" policies in purchase taxation and hire purchase regulation which have caused havoc in the TV set manufacturing industry, Mr Stanley warns that the damage done last year cannot entirely be got rid of in a matter of a few months. Even so, BEI shareholders saw their 5s shares slip back from 11s 3d to 10s 6d which, on the basis of the 15% dividend, means a yield of 7·1%. I'll stick my neck out and hazard that this is an opportunity second to none.

Despite the credit squeeze and H.P. curbs, J. and F. Stone Lighting and Radio did well to push up their pre-tax profits from a previous £915,802 to £1,019,218 for the year ended 30 June. The total dividend remains unchanged at 35%, but chairman Mr F. Bassett pleased shareholders with his proposal to form a property holding company which, in the first instance, will take over the group's freeholds. Later, it is expected to give shareholders a direct stake in the new company by making a free issue of shares. Mr Basset hopes to be in a position to make a further and more definite statement at the company annual meeting on 30 Nov. Meanwhile, Stone's 5s Ordinary shares have already anticipated some part of the value that this issue will involve with a spurt from 25s 6d to 28s 3d.—*From our City Correspondent.*

Aberdare Holdings

Details concerning a scrip and a rights issue will be issued shortly, directors state, announcing a steady 7½% interim dividend.

Aerialite

The decline in profit, expected since the interim dividend was cut in May, is shown by the preliminary results to have been even more severe than expected. With the TV accessories side of the business unable to bolster the highly competitive cable trading, profit before tax slipped £274,902 to £147,386 for the year to 31 May, and dividend is cut from 54% to 40%. After tax, net profit comes out at £66,257 (previously £115,460) and covers the dividend just under 1½ times.

British Electronic Industries

A "stop-go" table is produced by Mr C. O. Stanley in his first report of the newly constituted group and he argues convincingly that it makes the impossibility of production planning abundantly clear. Despite the "terrible experience" of Socialist planning between 1945 and 1951, he makes another plea for long-term planning and advances the suggestion that this need not be carried through by a Government machine, but could result from a co-operative association between industry, trade unions, economists and Government. As far as BEI is concerned, the TV receiver side of the business is clearly not yet out of the wood, but the "real strength" built up in other fields over the years, and new developments taking place, are expected to make past achievements look small. Prominent among the new developments are Pye's Scientific Instrument Centre, which is expected to open at Cambridge within five months, and Ekco's breakthrough with lightweight transistorised airborne radar.

Calcutta Electric Supply

A further £356,541 having been transferred to net revenue account for the year to March to make up the shortfall from the "reasonable return" agreed with the Indian Government, how much now remains in reserves? The balance sheet shows that this is £10·7 million, of which half is earmarked for plant expansion, replacements and contingencies. Sales rose by 138 million units to 1,955 million, continuing the growth that has trebled turnover in the past 14 years. In value, sales of current rose by £1 million to £9·8 million.

Dimplex

Shareholders must not expect miracles, Mr R. J. Wade, chairman, said at the annual meeting on Friday, but it was intended that they should have "their full share of the lolly."

Electrical Apparatus Co.

Dividend is being raised by 2% to 22% and a one-for-one scrip issue is announced. After tax, and subject to audit, group profit for the year to 31 July is £183,000, against £143,586 previously.

KG (Holdings)

The latest results represent a decline in profitability of nearly 7% because they include a full year's earnings of Modern Engineering Developments, an addition which almost doubled capital. The annual report shows that this decline was due to losses by the subsidiaries operating in the radio-TV field

Year to 31 Mar.	£ Trading Profit	£ Net to Parent	% on Ord.		Ord. Price*	
			Earned	Paid	High	Low
1957	228,947	54,401	40·7	30	5/10	2/7
1958	249,941	86,866	65·0	30†	3/10	2/-
1959	332,507	146,530	102·2	30	5/7	2/11
1960	250,325	98,672	34·3	32	5/11	3/10
1961	465,994	167,105	57·8	35	5/7	4/-

* Calendar year, except 1961, which is up to 6 Sept.
† Plus 40% capital issue in 7½% Pref. shares

and by WS Electronics, since sold to Ultra, rather than any disappointment concerning MED. Group earnings for the latest half-year are better. As reported on page 623, the electrical contracting business, F. H. Wheeler and Co., is to be hived off as a separate company with stock exchange listing.

J. and F. Stone Lighting and Radio

Better than expected profits are only part of the leaven for shareholders. Directors also promise a free issue of shares in a company to be formed to take over the firm's properties. The size of the bonus is not expected to be revealed before the annual meeting on 30 Nov., but with around 200 branches the scope is considerable. Preliminary results for the year to 30 June show pre-tax earnings up from £802,769 to £890,969 and dividend stays at 35%.

Dividends Announced

Edwards High Vacuum. Interim 5% (*same*).

Ever Ready Co. (GB). Interim 5% (*same*).

Reliance-Clifton Cables. Interim 8% (*same*).

OVERSEAS NEWS

from our correspondents abroad

CANADA

Profit Squeeze

Profits in Canada's electrical industry have dropped to an all-time low—2·3 c in the sales dollar—and 20% of electrical manufacturers lost money in 1960. This was stated at the annual meeting of the Canadian Electrical Manufacturers' Association earlier this month by the Association president, Mr T. Edmondson, who is also president of Ferranti-Packard Electric Ltd., of Toronto. Imports in 1949 were 19% of total domestic sales, rose to 30% last year and were still increasing, he said. Value of electrical products, $1,165 million at factory shipment level for 1960, was $1 million down on 1959. He stressed that they must try to reduce the unit cost of their products still further, while increasing exports. At present their exports represent only 4% to 5% of production. He urged that the tariff "end use" and "class or kind made in Canada" clauses should be adjusted on a reasonable basis. In his view, some tariffs should be reduced and others increased.

Underground for Montreal

Montreal is to have an underground railway system, with three routes covering about 21½ miles, it has now been decided. Total cost will be around $150 million. It is hoped to begin construction work next year with the aim of having trains running within four years. But with its strong French associations, the City Council is seeking advice on the project from engineers of the Paris Metro.

NORWAY

Rising Cost

Oslo's new underground transport system is now estimated to cost nearly £19 million by the time it is due for operation in 1965—compared with just over £11 million when planned in 1954. The increase, however, is mainly due to alterations introduced, raising the number of carriages needed from 80 to 100.

JORDAN

Diesel Plant Ordered

Four Mirrlees-Brush diesel generating sets have been ordered for power stations in Amman and Jordanian Jerusalem. Amman will have one 3,000 kW set and one 2,256 kW machine, while two 1,280 kW sets are required for the Jordanian sector of Jerusalem. The engines will be run on the surplus fuel oil from local refineries, and it is estimated that £60,000 a year will be saved, compared with the use of conventional diesel fuel.

S. AFRICA

Recession?

Faced with a much smaller percentage increase in electricity consumption, Johannesburg City Council is now planning to postpone power plant extensions, for which orders were placed some years ago. The Council is sending a delegation overseas to confer with their consulting engineers, Merz and McLellan, and the plant manufacturers, GEC, on the matter. Electricity consumption increase has not been maintained at around the 10% mark, but has dropped to 5%, and the number of people taking advantage of the Council's loan schemes for purchasing domestic appliances fell from 2,262 in 1953 to 903 last year. As an aid to stimulating expansion the Electricity Dept. has proposed that the limit for the home appliance loans should be raised from £150 to £250, and a somewhat similar scheme should provide for loans to industrialists to enable the latter to replace coal-burning apparatus with electrical equipment.

INDIA

Meter Production

Already manufacturing switchgear at its Bombay factory, the Electrical Instruments Manufacturing Co. proposes to set up a plant at Naroda, in Ahmedabad, for the annual production of 60,000 a.c. single-phase meters and 24,000 polyphase meters. In connection with this expansion the company is now seeking fresh capital locally. A technical collaboration agreement has been entered into with Valmet Oy, Helsinki, Finland. Orders for plant and machinery have been placed with concerns in East Europe. Construction of the factory building is to start next month and it is expected that production will commence about the middle of 1962.

Avoiding Troubles

To ensure that India's third Five-Year Plan target for power is achieved according to schedule, experts of the Planning Commission and the Union Irrigation and Power Ministry are touring every State. This results from a decision of the Commission that the power muddle which became one of the major bottlenecks of the Second Plan should not be allowed to recur during the Third. An analysis of the Second Plan's failures in the field of power revealed that delays were not always caused by shortage of foreign exchange. They were often due to organisational inadequacies, inexpert planning and failure to mobilise key materials even when locally available. It is now being emphasised that these mistakes must not be repeated.

Plant Lost

Target date for completion of the first stage of the Sharavthy Valley hydroelectric project has been put back some six months—to the middle of 1963. Main reason for this change is the loss of equipment, ordered for the project, in a shipwreck a few months ago. Orders for the turbines, generators and transformers have been placed with French and Japanese firms.

Loan Sought

To finance its capital projects, the Maharashtra State Electricity Board propose to raise a loan of Rs2¼ crores. The issue, at 4½%, will be open for public subscription at the end of October. The Board's capital programme under the third Five-Year Plan would need funds totalling Rs52 crores. A loan of Rs5·8 crores has already been sought from the International Development Association, an affiliate of the World Bank, for rural electrification and for power supply for agricultural needs during that plan. There are also proposals to extend the Khaperkheda and Paras steam stations by 60 MW, and for a new 60 MW station at Bhusaval. The Board also has under consideration the establishment of a 300 MW steam station in the Kalyan-Nasik area.

PAKISTAN

Electrification Agreement

The Government of Sweden and Pakistan have entered into an agreement which provides, *inter alia*, for the electrification of two small towns in the coastal area of East Pakistan. Under this, Sweden will provide three diesel generating sets, the main switchgear, l.v. cables and aluminium boxes for cable connections and meters.

AUSTRALIA

Bauxite Mining

The Western Australian Parliament has approved the agreement between the Government and Western Aluminium NL for the establishment of an alumina refinery at Kwinana. The company, a subsidiary of Western Mining Corporation, has already spent over £300,000 on developing the bauxite deposits of the Darling Range, near Perth, and plans to spend about £10 million on the whole project. But the refined ore is to be shipped to Melbourne for final conversion of alumina to aluminium.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

27 Oct.—Cork. Electrical installations, new Opera House.—See 19 Oct. issue.

27 Oct.—Edinburgh Northern Hospitals. (2) Electrical work in X-ray and out-patients' depts.—See 19 Oct. issue.

27 Oct.—Farnham U.D.C. Electrical installation renewal in 66 houses on various estates. Engineer and Surveyor, Council Offices, South St. Deposit £2 2s. N.I.C. firms only.

27 Oct.—Howden R.D.C. Contract 2. Supply of 160, 200, 260 and 375 g.p.m. duplicate sewage and one 100 g.p.m. sludge pump complete with motors/starters/accessories for Bubwith and Foggathorpe Scheme.—See 12 Oct. issue.

27 Oct.—Larne B.C. Electrical installation in Agnew St public conveniences.—See 19 Oct. issue.

28 Oct.—Bristol C.C. Supply: lamps, transformers/capacitors, sundries, cables, etc.—Advertised 19 Oct. issue.

28 Oct.—Taunton B.C. Supply: electrical goods.—See 19 Oct. issue.

30 Oct.—Chesterfield B.C. Supply of: (1) 165 25 ft tubular steel columns and three wall brackets; (2) 157 140 W sodium lanterns and one post-top 140 W sodium lantern; (3) 17 3 x 80 W fluorescent lanterns/lamps/gear, alternatively 17 400 W colour-corrected mercury lanterns/lamps/gear; (4) 158 140 W sodium lamps/gear; (5) erection of columns/brackets and removal of 146 concrete 25 ft columns.—Advertised 12 Oct. issue.

30 Oct.—Dunfermline C.C. Separate trades tender electrical installations in 31 dwellings at Pillencrieff St. Applications to Burgh Architect, 6 Abbot St, by above date.

30 Oct.—Hyde B.C. Provision and erection of 150 Class "B" columns complete with lanterns/gear and the removal of 64 gas fittings. Borough Surveyor, Municipal Bldgs, Greenfield St.

30 Oct.—Newtownabbey. (3) Electrical engineering services in new school buildings, etc., for Board of Governors of Belfast High School.—See 12 Oct. issue.

30 Oct.—Swaffham U.D.C. Supply and erection of 37 Gp "A" steel columns and equipment for street lighting improvement scheme. Surveyor, J. Miles, Town Hall, Swaffham, Norfolk.

30 Oct.—Worsley U.D.C. Supply and installation, on fixed-price basis, of 1,000 g.p.m. at 23 ft head, sewage pumps, etc.—See 12 Oct. issue.

31 Oct.—Cardiff C.C. Electrical installations, on fixed-price basis, in various types of new houses. City Surveyor, City Hall. Deposit £5 5s, made payable to Cardiff Corpn. N.I.C. firms only.

31 Oct.—Fermanagh C.C. (c) Electrical work in old people's home.—See 12 Oct. issue.

31 Oct.—Taunton B.C. Provision and installation of 83 electric sink water heaters, Lambrooke, Lyngford and Wedlands estates.—See 19 Oct. issue.

1 Nov.—Allestree P.C. 34 concrete columns and 17 steel brackets on existing trolley poles complete with 140 W sodium lanterns.—Advertised 19 Oct. issue.

1 Nov.—Bournemouth C.B.C. Supply of: (a) electrical industrial truck and charger; (b) electrical street cleaning truck and charger.—See 28 Sept. issue.

1 Nov.—Colemine. Heating installation in Camus-Juxta-Bann Church, Macosquin.—See 12 Oct. issue.

1 Nov.—Dartford B.C. Supply and erection of 75 25 ft concrete columns and 400 W MBF/U lamps/lamps, together with removal of existing installations along Town Centre approach roads.—See 12 Oct. issue.

1 Nov.—Norwich C.C. Supply and erection of Hotblack Rd, Magdalen St (Pt), Chapelfield Rd, St. Clements Hill and Silver Rd street lighting. Applications to City Engineer, City Hall, by above date.—Advertised in this issue.

3 Nov.—Bognor Regis U.D.C. Supply and erection of Group "A" and "B" lighting, on fixed-price basis, comprising 196 "Stanton" columns and "G.E.C." lanterns, together with the removal of redundant installations.—See 12 Oct. issue.

3 Nov.—Matlock U.D.C. Provision and erection of 28 Group "A" 140 W sodium lighting on steel columns.—Advertised 12 Oct. issue.

3 Nov.—Notts C.C. Provision and erection of illuminated motorway type traffic signs along six miles A1.—See 12 Oct. issue.

4 Nov.—Cork C.C. Supply and installation of duplicate pumps for 4,000 g.p.h. at 234 ft head at Dripsey. Plant to be complete with motors, switchgear, pipework and valves; and the pumphouse to be wired for power, light and heat. Secretary, Cork C.C., 7 Fr Mathew Quay.

6 Nov.—Clowne P.C. Supply of (1) 115 25 ft tubular steel columns/brackets; (2) 115 140 W sodium Group "A" lanterns; (3) 115 140 W sodium lamps. Erection of columns.—Advertised 28 Sept. issue.

6 Nov.—Durham C.C. Ten electrically operated diesel delivery pumps.—See 19 Oct. issue.

6 Nov.—East Riding C.C. Installation of electrical services at proposed Norton County Secondary School and proposed Norton home for aged persons.—See 19 Oct. issue.

6 Nov.—Fylde Water Board. Supply and installation of electrically driven sludge stirring mechanism, 30 ft dia, for Stoks Filtration Plant, Slaidburn.—See 19 Oct. issue.

6 Nov.—Newtownabbey U.D.C. 250 Group "B" fluorescent lanterns/lamps/control gear/concrete columns.—See 5 Oct. issue.

8 Nov.—Sedbergh R.D.C. Erection of master aerial for TV system, provision of amplifiers and installation of distribution cable to 220 council houses.—See 19 Oct. issue.

8 Nov.—Yorkshire E.B. Supply of distribution transformers.—See 12 Oct. issue.

10 Nov.—Down C.C. Electrical installation in Divisional Office and Clinic extension, Pound La, Downpatrick. Details from consulting engineers, McCandless and Barton, 6 Murray St, Belfast 1. Deposit £3.

12 Nov.—Sunderland C.B.C. £45,000 electrical installation in Technical College, South Johnson St.—Advertised 19 Oct. issue.

13 Nov.—E.B. for N. Ireland. One set of hydrazine hydrate dosing equipment for Coolkeeragh. Applications to consulting engineers, Kennedy and Donkin, 64 Royal Exchange, Manchester 2, by 27 Oct. Deposit £5 5s.

13 Nov.—Holywood U.D.C. Electrical installation in proposed sports pavilion, Seapark recreation grounds. Surveyor, Council Offices.

13 Nov.—Hornchurch U.D.C. (1) Supply of 275 g.p.m. sewage pumping plant, motors and gear for Parsonage Rd pumping station. Engineer and Surveyor, Billet La. Deposit £2 2s.

13 Nov.—Strabane R.D.C. Supply and installation of 60 g.p.m. at 25 ft head sewage pump. Details from W. D. R. and R. T. Taggart, 13 College Gdns, Belfast 9. Deposit £3 3s.

14 Nov.—Loughborough B.C. Provision and erection of 13 Group "A" steel columns with 400 W mercury lighting. Borough Engineer and Surveyor: J. S. Bates, Southfields. Deposit £2 2s.

24 Nov.—Hereford C.C. Electrical installations in 74 houses No. 6 site and 72 houses No. 7 site, Newton Farm. City Architect, Town Hall. Deposit £1 1s each group.—Advertised in this issue.

2 Dec.—Kilkenny C.C. One 1,000 g.p.h. submersible pump. Details from consulting engineers, P. H. McCarthy and Son, 26 Lower Leeson St, Dublin 2. Deposit £5 5s.

No date stated—Lower Wick. (d) Electrical installations in Wick Hse. Applications to Agent, J. Braybrook, The Rockery, Brigstock, Kettering.

No date stated—Montgomeryshire C.C. Supply of lamps. Details from Director of Education, J. A. Davies, Education Offices, Newtown.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 112 queries answered this week

"Fiat" refrigerators — agents for? Y.E.B.—Adler Electronics Ltd., 132 Cheapside, E.C.2.

All-insulated, moulded plastic, bulkhead fittings—makers of? E.E.B.—Heyes and Co. Ltd., Water-Heyes Electrical Wks, Orchard St, Wigan.

Charles Austin Pumps Ltd.—address for? S.E.E.B.—Petersham Wks, High Rd, Byfleet, Surrey.

Aluminium flp conduit fittings—makers of? W.B.—Walsall Conduits Ltd., Excelsior Wks, Dial La, West Bromwich, Staffs.

"Emoire" trouser pressers—address for? G.T.—Lighters Ltd., Pioneer Hse, Inverness Rd, Hounslow, Middx.

"Cutawl" cutting machines—address for? H.W.—Super Tools (1951) Ltd., 30 Fauconberg Rd, W.4.

Greenhouse heating conversion systems for existing solid fuel installations — makers of? W.L.—County Works Ltd., Newport, Mon.

"Strobotorch" stroboscopes — makers of? E.E.B.—Dawe Instruments Ltd., Harlequin Ave, Gt. West Rd, Brentford, Middx.

"Drymaster" spin dryers—suppliers of? L.E.B.—Drymaster Ltd., 192 Kensington Church St, W.8.

"Spiromic" skirting board heaters—makers of? R.G.—A. and R. Electric Co. Ltd., 1 Bruce Ave, Shepperton.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

1 Nov.—America. Two 36-4 MVA 143/13·2 kV 3-ph. transformers, one 60-80 MVA 161/143 kV 3-ph. auto-transformer and lightning arresters. U.S. Army, Engineer District, Tulsa Corps of Engineers, P.O. Box 61, Tulsa, Oklahoma. B.o.T. (ESB/32572/61).*

4 Nov.—India. Testing apparatus (17 items), including industrial X-ray unit, creep testing machine, quartz spectograph and ultrasonic flaw detector. Joint Director of Industries and Commerce, Guindy, Madras 32. B.o.T. (ESB/33121/61).*

6 Nov.—Burma. Cable, v.i.r., p.v.c., paper insulated and lead covered and resistance wire (11 items). Director-General, Union of Burma Purchase Board, St. John's Rd, Rangoon. B.o.T. (ESB/32852/61).*

7 Nov.—America. One 15 MVA autotransformer and one 2·5 MVA power transformer. Dept. of the Interior, Bureau of Reclamation, Bldg 53, Denver Federal Center. B.o.T. (ESB/32300/61).*

7 Nov.—Philippines. Conductor a.c.s.r./galvanised steel wire/insulators/clamps/fittings/accessories for 115 kV Angat-Balintawak transmission line. General Manager, National Power Corpn., Port Area, Manila. B.o.T. (ESB/32883/61).*

13 Nov.—Pakistan. 18,000 g.e.s. cap, 230 V, 300 W, gas filled metal filament lamps. Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong. B.o.T. (ESB/33124/61).*

16 Nov.—Pakistan. Supply of four 58,000 U.S. g.p.m. pumps with motors; two motor control boards, metal enclosed; two transformers. Purchasing Directorate, E.P.W.A.P.D.A., D.I.T. Bldg, Dacca. (ESB/31628/61.)*

21 Nov.—India. Requirements of Chief Engineer (South), Stores Purchase Section, Punjab S.E.B., The Mall, Patiala: 21 Nov.—400 V meters with m.d. indication. B.o.T. (ESB/32259/61)*; 22 Nov.—22 and 33 kV metering equipment. B.o.T. (ESB/32267/61)*; 29 Nov.—Energy meters. B.o.T. (ESB/32260/61)*; 30 Dec. and 11 Jan..—Time-switches. B.o.T. (ESB/32262 and 3/61)*; 28 Nov.—32 kV air-break switches. B.o.T. (ESB/32265/61)*; 11 Dec.—11 kV metering equipment. B.o.T. (ESB/32261/61)*; 13 Dec.—Surge diverters. B.o.T. (ESB/32266/61).*

23 Nov.—India. 11 kV metering equipment. Superintending Engineer, Technical (Electrical), Andhra Pradesh S.E.B., 10-2-3 A.C. Guards, Hyderabad, Deccan 4. B.o.T. (ESB/32255/61).*

23 Nov.—Sudan. Lighting fittings, boxes, underground cable l.t., pole straps and insulating compound. Controller of Stores, Sudan Railways, Atbara. B.o.T. (ESB/32521/61).*

24 Nov.—Uganda. Two 250 kW transportable diesel generators for Uganda E.B. Details from Kennedy and Donkin (E. Africa), P.O. Box 2825, Kampala, Uganda. B.o.T. (ESB/32518/61).*

28 Nov.—Canada. 14 230 V disconnect switches and support structures; seven 115 kV c.b's. General Manager: W. D. Fallis, Manitoba Hydro, P.O. Box 815, Winnipeg 1. B.o.T. (ESB/32832 and 32892/61).*

28 Nov.—India. Four ultrasonic crack detectors. Director-General of Supplies and Disposals, Shahjahan Rd, New Delhi. B.o.T. (ESB/32272/61).*

29 Nov.—India. 440 V metering equipment. Superintending Engineer, Technical (Electrical), Andhra Pradesh S.E.B., 10-2-3 A.C. Guards, Hyderabad, Deccan 4. B.o.T. (ESB/32274/61).*

30 Nov.—India. (1) Swing tray chain conveyor system; (2) Goods and passenger lifts; (3) Case elevators for Tea Warehouse at Libyan Depot, King George's Dock, Calcutta. Documents, fee £8 each item, from consulting engineers, Rendel Palmer and Tritton, 125 Victoria St, S.W.1.

12 Dec.—New Zealand. 1,500 mile of 76/·1463 aluminium and 7/·1138 galvanised steel conductor. Secretary, Tenders Committee, N.Z. Electricity Dept., Wellington. B.o.T. (ESB/32279/61).*

30 Dec.—India. 25 and 110 kV switchgear and remote control equipment for 25 kV 50 c/s railway electrification, Tambaram-Villupuram. Documents from General Manager and Chief Engineer, Railway Electrification, 235 Acharya Jagadish Bose Rd, Calcutta 20, on cash payment of Rs 25, to Cashier at 232 Acharya Jagadish Bose Rd.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Aintree Electrical Ltd., 181 Altway, Aintree, Lancs. Nom. cap.: £1,000. Dirs.: Sybil H. Bleasdale and Mavis L. Harrop.

Ali Points Electric Co. Ltd., 2 Reservoir Rd, Ruislip, Middx. Nom. cap.: £3,000. Dirs.: Albert H. Garside and Jim K. Klarfield.

Ames (Wholesalers) Ltd., 7a Coppetts Rd, N.10. Dealers in electrical goods of all kinds, etc. Nom. cap.: £100. Dirs.: Eugene A. C. Roberts and Mark Hyams.

L. Beck (G.B.) Ltd., 414 Chiswick High Rd, W.4. To enter into an agreement with L. Beck Nachf, Offene Handelsgesellschaft; Goldring Manufacturing Co. (Great Britain) Ltd.; and Impectron Ltd.; and to carry on the business of manufacturers of and dealers in variable solid dielectric gang condensers and accessories of all kinds, etc. Nom. cap.: £10,000. Dirs.: Frederick Fisher, Richard Holz and Erwin Scharf.

Brett Electrical Co. Ltd., 12-13 Richmond Bldgs, W.1. Electrical engineers, etc. Nom. cap.: £100. Dirs.: David Brett and Sonya Brett.

C.C.T.V. Ltd., 35 Frogmoor, High Wycombe. Designers, manufacturers of and dealers in industrial and domestic electric equipment, etc. Nom. cap.: £1,000. Dirs.: Claude Birks and Kenneth M. Bridger.

Haynes Bros. (Wallingford) Ltd., Industrial Estate, Wallingford, Berks. Electrical engineers, etc. Nom. cap.: £100. Dirs.: Keith R. Haynes, Lena M. Haynes, John C. Haynes and Elsie E. Haynes.

Kelvin Electrical Industries Ltd., Kelvin Wks, Hackbridge, Surrey. Nom. cap.: £1,000. Dirs.: Alfred L. Foulger and Derrick W. Page.

Tin-A-Lum Ltd. Electrical, chemical, mechanical and general engineers, etc. Nom. cap.: £20,000. Dirs. not named. Subs.: L. Brothwood and E. R. Ward, 18 Austin Friars, E.C.2.

CONTRACTS PLACED

Bolsover U.D.C. Supply of 56 Gp "A" and 70 Gp "B" steel columns complete with lanterns/gear, Abacus Municipal Ltd.

C.E.G.B. Contracts placed during September, amounting to £7,637,700, include: Thorpe Marsh power station: 415 V switchgear, switch fusegear, motor control gear and accessories, M. and C. Switchgear Ltd.—Blyth "B" power station: heating, lighting and plug point installation for turbine house, boiler house and ancillary buildings, F. H. Wheeler and Co. Ltd.—West Burton power station: coal handling plant, Birtley Eng. Ltd.; main C.W. pumps and motors associated with Nos. 1, 2, 3 and 4 500 MW turbo-generators, Gwynnes Pumps Ltd.—Ferrybridge "C" power station: structural steelwork, Redpath, Brown and Co. Ltd.; starting and stand-by boiler feed pumps and motors, G. and J. Weir Ltd.; preliminary site works, M. J. Gleeson (Contractors) Ltd.—Drakelow "C" power station: h.p. pipework and valves for unit No. 11, Aiton and Co. Ltd.; h.p. pipework and valves for unit No. 12. Stewarts and Lloyds Ltd.—Belvedere power station: general site completion works, J. Jarvis and Son Ltd.; 132 kV switchgear, English Electric Co. Ltd.—West Thurrock power station: low pressure pipework, valves, auxiliary pumps and tanks associated with sets Nos. 3 and 4, Stewarts and Lloyds Ltd.—High Marnham power station: 380/275 kV transformer, English Electric Co. Ltd.—Kendal substation: two 45 MVA, 132/33 kV transformers, Yorkshire Electric Transformer Co. Ltd.—Beddington substation: 132 kV switchgear, English Electric Co. Ltd.—Whitson substation: substation superstructure, Gee, Walker and Slater Ltd.

C.E.G.B. (S.E. Region). Contracts placed during September amounted to £909,879 include: Bengeworth Rd, 33 kV cabling, B.I.C.C.; Eltham, 132 kV switchgear, English Electric Co.; Finsbury Market, 132 kV cabling, W. T. Glover Ltd.; Lombard Rd, 66 kV switchgear, A. Reyrolle and Co.; Moscow Rd, 66 kV cabling, Pirelli-General; Wandsworth, 132 kV switchgear, A. Reyrolle and Co.; Wandsworth, 66 kV cabling, B.I.C.C. Co.; Wimbledon, 33 kV switchgear, A. Reyrolle and Co.; Wimbledon-Wandsworth, 132 kV cabling, Pirelli-General; Ashford-Ruckinge, 132 kV switchgear, English Electric Co.; Beddington-Purley, 132 kV cabling, Enfield Standard P.C.; Maidstone, 1-30 MVA 132/11 kV transformer, Fuller Electric; Bury St. Edmunds, 2-60 MVA 132/33 kV transformers, C. A. Parsons Ltd.; Chelmsford, 132 kV switchgear, A. Reyrolle and Co.; Brunswick Wharf, "Taprogge" cleaning equipment, Yorkshire Imp. Metals; Fulham, air compressor, Alley Compressors; Grove Rd, m.s. flues, Ed. Farr Ltd.; Barking, shot cleaning equipment, Babcock and Wilcox Ltd.; Barking, "Taprogge" cleaning equipment, Yorkshire Imp. Metals.

Gateshead B.C. Electrical installation in new Gateshead Boys' Grammar School, Campbell and Isherwood Ltd., £12,438.

Leeds C.C. Supply of 250 60 W sodium lanterns, Eleco, £6 19s 3d each. Recommended.

Newcastle upon Tyne Hospital Board. Electrical installation for new boiler plant at Newcastle General Hospital. J. Scott and Co., £17,235 3s 6d.

Peterborough C.C. Supply and erection of 56 Gp "A" steel columns in City Centre and 588 Gp "B" concrete columns along various roads, all complete with lanterns/gear, Abacus Municipal Ltd.

Plymouth C.B.C. Electrical installations in 24 flats at Southway, Madge and Son, £2,449. Lift installation in Ingleside Home, Hammond and Champness Ltd., £2,167. Recommended.

Tottenham B.C. Supply of street lighting equipment: (a) Group "B" concrete columns, Concrete Utilities Ltd., £10,191; (b) 60 W sodium lanterns, Phosco Ltd., £4,564; (c) electrical gear, Philips Electrical Co., £3,216. Recommended.

Watford B.C. Standby generating plant for The Grove Waterworks, W. H. Allen Ltd., £21,169. Electrical work in Central Library, L. J. Ive Ltd., £1,948. Recommended.

TRADE NOTES

Change of Telephone No. As from 1 Nov. the telephone number of Gresham Transformers Ltd (Power Division), Gresham Lion Electronics Ltd., Gresham Automation Ltd. and the Gresham Lion Group Ltd. will be Feltham 3655.

Integration. As a preliminary step towards the full integration of the two companies in January 1962, the Spares Departments of Mirrlees, Bickerton and Day Ltd. and the National Gas and Oil Engine Co. Ltd. are being combined into one unit at Ashton-under-Lyne, from 6 Nov. Correspondence relating to spares should continue to be addressed to the company concerned, but from 6 Nov. all telephone inquiries for spares should be made to Ashton-under-Lyne 1861.

London Showroom. Turners Asbestos Cement Co. Ltd., officially opened their new showroom at 34 Dover St, W.1. last week.

Thailand Tax. A Business Tax has been introduced by the Government of Thailand, on revenue of all kinds of commercial undertakings, including importing. Most import items carry a tax of 5%, but on refrigerators, freezers and air conditioners, vacuum cleaners, floor polishers, cooking apparatus, radio and TV sets, etc., the rate is 12%; and on electric irons, fans and lampshades the rate is 10%

BUSINESS PROSPECTS

Aberdeen. £96,813 tender from Donald C. Stewart, Bridge-of-Don, Aberdeen, accepted for radiotherapy unit at Royal Infirmary Foresterhill.

Abingdon. Contract for eight-acre site for research centre for Esso Ltd. awarded to W. E. Chivers and Sons Ltd., Devizes.

Amesbury. Clifton Catholic Diocesan Trustees plan new R.C. primary school, Amesbury.

Audenshaw. Nathan Brown Estates Ltd. have plan to develop 20-acre industrial estate, Shepley Rd.

Bedford. W. H. A. Robertson and Co. Ltd., Ampthill Rd, propose £1¼ million extensions to engineering works.

Birmingham C.C. Tender: 151 two- and four-storey dwellings, Nechells Green redevelopment; City Architect. Development proposed, Gt. Lister St, by Fifield Worsey and Sons Ltd., 52 Lawley St, Birmingham 4.

Blackburn. Tender: five-storey ward block, two-storey pathology laboratory and two-storey operating theatre, Blackburn Royal Infirmary; Regional Architect, Manchester Regional Hospital Board, Cheetwood Rd, Manchester 8.

Blackpool C.B.C. Tender: Anchorsholme branch library; Surveyor, P.O. Box 17.

Bolton. Proposed: three 17-storey blocks of flats, three- and six-storey blocks of shops with offices over, a supermarket, etc., Moss Bank Rd/Blackburn Rd, for Actan Ltd.; three shops with offices over and public house, Churchgate/Princess St, for Commercial Holdings Ltd.

Boston. B.C. proposes provision of electricity to pre-war council houses; cost: £2,100; Surveyor.

Bridgend. Shops/flats, Maesteg, proposed for Tilehurst Property Co. Ltd.; quantity surveyors: R. J. Playle, 58 Cannon St, E.C.4.

Bristol. The Muller Homes for Children, Muller Hse, 7 Cotham Park, Bristol 6, propose new hostel and enlargement of nursery, Weston.

Bromley. Alliance Building Soc. Ltd., North St, Brighton, to rebuild office block, High St; architects: Jackson and Greenen, Hinton Bldgs, Hinton Rd, Bournemouth.

Camborne. Proposed: new school, Glebe Fields, for Truro Diocesan Education Committee; architects: Geoffrey Bazeley and Barbary, 5 Portland Sq, Plymouth.

Cardiff C.C. Tender: 221 houses, Pentrebane Rd, Fairwater; City Architect.

Carlisle. Royal Globe Insurance Group plan office block, Lowther St.

Chester. Conversion of Gaumont Cinema site into bowling centre and licensed club planned by Rank Organisation Ltd., 11 Belgrave Rd, S.W.1.

Chesterfield. M.o.W. propose nine-storey admin. block for G.P.O., West Bars.

Crawley. The S.W. Metropolitan Regional Hospital Board accepted tender of £64,367 by James Longley and Co. Ltd., Joinery Wks, Crawley, for staff accommodation, hospital site.

Darlington. T.C. propose supply of electricity to McMullen Rd caravan site at cost of £2,037.

Dorking. New premises to cost £80,000 proposed by West Foodstores Ltd.; architects: H. A. Halpern and Associates, 58 Cannon St, E.C.4.

Durham. County Water Board propose £11,600 electrification work, Waskerley filtration plant.

Exeter. Proposed at Christow Rd by Carr and Quick Ltd., 16 Queen St, depot and offices.

Farnborough. Consolidated Electrodynamics Corpn. (U.K.) Ltd. propose large factory here.

Felling. U.D.C. propose 252 dwellings, various sites, in 1962; Surveyor.

Gateshead. Middleton and Co., Queen Alexandra Approach, Sunderland, contractors for £260,958 Gateshead Boys' Grammar School. Newcastle Regional Hospital Board propose renewal of electrical and engineering services, Dunston Hill Hospital.

Glasgow. Proposed: factory and office buildings at Plot "J," and offices and warehouse at Plot "P," Dixon's Blazes, Lawmoor St, C.5, for Taylor Woodrow Industrial Estates Ltd., Western Ave, W.5. Proposed: five-storey students' hostel, "Rosshall," Crookston Rd, S.W.2, for Scottish College of Commerce; architects: Frank Burnet and Boston, 180 Hope St, Glasgow C.2. Parway Land and Investments Ltd., Finchley Rd, N.W.3, propose a nine-storey office block with basement car park, Charing Cross area; architects: Royce, Stevenson and Tasker, 3 Field Court, Gray's Inn, W.C.1.

Godalming. B.C. propose 40 houses, Green La site, in 1962; Engineer.

Grimsby. Sheffield Regional Hospital Board recommended to appoint Leake and Wilson, 27 High St, Hull, consulting engineers for mechanical and electrical services for boiler, Scartho Rd Hospital.

Harpenden. Extensions proposed at Rothamsted Experimental Station for Lawes Agricultural Trust; architects: Cowper, Poole and Ptnrs., 39 Gordon Sq, W.C.1.

Hastings. Proposed by Freevale Properties Ltd., 215 Regent St, W.1, development of nearly ten acres, north of Ponswood industrial estate for light industry. B.C. propose supply and installation of electrical heating equipment in education dept; Borough Engineer.

Hereford. Proposed: hall of residence, Hereford Training College, for C.C.

Heywood. Proposed by James Berry Ltd., Chapel St, motel/restaurant/helicopter station, Heywood-Bury Rd, Lancs.

Hove. B.C. proposes works at refuse destructor plant as follows: buildings to cost £74,470; installation of new plant, £114,950.

Hull. Proposed by Covenant Securities Ltd., 103 Mount St, W.1, industrial development, Old Stoneferry goods station.

Huntingdon and Godmanchester. B.C. award £223,945 contract for 99 dwellings, L.C.C. overspill estate, to Drabble Construction Ltd., Huntingdon.

Hunts. C.C. award £138,033 tender for new Sawtry secondary modern school to F. B. Thachray and Co. Ltd., St. Peter's Hill, Huntingdon.

Ipswich. Planned on 2¼ acres, Whitton White Hough, to Joseph Hunt Bakeries Ltd., Ipswich, bakery, offices, flats and garages.

Isle of Axholme. R.D.C. propose 42 dwellings in 1962; Surveyor, Epworth, Lincs.

Kendal. Contract placed for the first stage of £200,000 milk drying factory for Glaxo Laboratories Ltd., Greenford; contractors: Taylor Woodrow Construction Ltd., Western Hse, Western Ave, W.5.

Kew. Laboratory and lecture theatre, Royal Botanical Gardens, planned by the Ministry of Works; Architect's Department, Abell Hse, John Islip St, S.W.1.

Leeds. 17 shops, Garforth, proposed by Second Covent Garden Property Co. Ltd., 55 Pall Mall, S.W.1.

Leics. C.C. propose extensions to Loughborough Training College on Martin Hall site, Ashby Rd; cost: £585,440. Also proposed: first phase of new Colleges of Art and Further Education, Loughborough, complete contract to cost £1 million; County Architect, Leicester.

London. The Furniture Development Council, 11 Adelphi Terr, W.C.2, propose new premises at St. Matthew's Row, E.2; quantity surveyors: Davis, Belfield and Everest, 21 Ashley Pl, S.W.1. Reconstruction of factory, shops, etc., at Mansell St/Prescott St, E.1, proposed; architects: Gordon and Gordon, Finsbury Hse, Blomfield St, E.C.2. Factory and offices proposed at Beech St, S.W., for Shilton Ltd., 34 Beech St. E.C.1; quantity surveyors: J. B. Marks and Ptnrs., 106 High St, Guildford; cost: £70,000. Proposed: redevelopment of Foundling Estate, St. Pancras, for E. Alec Colman Group, 5 Hyde Park Gate, S.W.7; architect: Professor Sir Leslie Martin, King's Mill, Great Shelford.

Maidenhead. A new printing works and warehouse to cost £140,000 proposed at Furze Platt for Hazell, Watson and Viney Ltd., Gt. Queen St, W.C.2; architects: K. Wakeford, Jerram and Harris, 7 Connaught Pl, W.2.

Manchester. Laboratory, offices, Wynnstay Rd, Fallowfield, proposed by Flatters and Garnett Ltd., 309 Oxford Rd, Manchester 13.

Mansfield. B.C. propose destructor plant for refuse disposal, Bath La; cost: £190,000.

Middlesbrough. A. E. Gray and Son, Tynedale St, Stockton, propose 50 bungalows, Tollesby Rd; Architect, J. G. L. Poulson, 54 Albert Rd. B.C. propose 57 dwellings, Dunstable Rd; Engineer. New machine shops and offices, East St, Gray St, planned for Head, Wrightson and Co. Ltd., Middlesbrough.

Milford Haven. Planned: R.C. primary school, Meads, by Menevin Diocesan Education Committee, Rt Rev J. E. Pettit, Bishop's Hse, Wrexham.

Newcastle. B.C. propose 15 acres, Scotswood Rd area, as trading estate; firms taking sites will build own factories.

Northumberland. C.C. propose girls' grammar school, Alnwick; County Architect, Gt North Rd, Newcastle.

Norwich. Five-storey office block planned on site of Norvic Cinema, Prince of Wales Rd, for Raymond King Organisation; architects: T. P. H. and E. Braddock, 14 Gt. Smith St, S.W.1.

Nottingham. Portman Provincial Cinemas Ltd., Globe Cinema, Trent Bridge, plan seven shops with maisonnettes over, Burlington and Mansfield roads.

Oxford. University propose a mathematical institute, 24-29 St. Giles. Shops and maisonnettes, London Rd, proposed for Oak Property Co. Ltd., 14 Cromwell Pl, S.W.7; architect: A. J. Fowles, 10 Gt. James St, W.C.1.

Penrith. Border Engineering Contractors, Queen St, Whitehaven, contractors for 57 houses, Wetheriggs.

Peterborough. Oddenino's Property and Investment Co. Ltd., 52 Berkeley Sq, W.1, propose phase one of development of Broadway-Midgate site.

Plymouth C.C. Tender: 60 flats, six shops and two laundries, St. Mary St, Stonehouse; City Architect.

Rochester C.C. Tender: 79 dwellings, Earl estate; Surveyor.

St. Paul's Cray. Factory at reported cost of £100,000 proposed for H. W. Sullivan Ltd., Leo St, S.E.15; quantity surveyors: E. C. Harris and Ptnrs., Lynton Hse, Tavistock Sq, W.C.1.

Salford. Improvements to the X-ray dept. and nurses' accommodation, Royal Manchester Children's Hospital, Pendlebury, proposed by Salford Hospital Management Committee.

Scunthorpe. Sheffield Regional Hospital Board propose £¼ million reconstruction and extension scheme for Scunthorpe War Memorial Hospital. Sheffield Regional Hospital Board awarded contract for £489,348 to Quibell and Hardy Ltd., of 17 Henry St, for remodelling and additional stories to Coronation block at Scunthorpe and Dist. War Memorial Hospital. Proposed: supermarket and nine shops, Doncaster Rd, for Venture Property and Development Co. Ltd., 3 Buckingham Palace Gdns, S.W.1.

Sedgefield. Offices and showrooms, West Cornforth, planned for Hepplewhite Ltd.; architects: Tarren and Caller, 24 Front St.

Sheringham. Kingsland Engineering Co., 25 Hackney Rd, E.2, propose to develop over five acres, Weybourne Rd, for factory to cover 20,000 sq ft.

Shotley Bridge. Proposed: casualty, outpatients' and X-ray dept, Shotley Bridge General Hospital; Architect, Newcastle Hospital Board, Benfield Rd, Newcastle.

Somerset. The Home Office approved site,

Business Prospects—continued

West Hatch, for approved school, to cost between £250,000-£300,000.

South Ascot. Trustees of the Franciscan Order of Friars propose R.C. primary school; architects: Archard and Ptnrs., 20 Lowndes St, S.W.1.

South Shields. Newcastle Regional Hospital Board propose £13,000 improvements for electricity supply, South Shields Hospital. Plans by L. D. Rooker, 17 Leafield Cres, for ice cream factory, Maxwell St, for Minchella and Co. Ltd.

Stirling B.C. Tender: 82 traditional dwellings, Cornton redevelopment; Burgh Architect.

Stockton. Moore and Cartwright, High St, Norton, contractors for 57 houses, Victoria, for B.C.

Sunderland. T.C. award contract for 48 houses, Pennywell estate, to J. Prentice Ltd., Leeds St. Planned: three-storey offices/shops, Central Railway Station, for Metrovincial Properties Ltd., 15a Hay Hill, W.1; architect: J. G. L. Poulson, 54 Albert Rd, Middlesbrough. Four-storey shopping block, Union St, proposed by Heron Group, 21 Chiswell St, E.C.1; architects: Boyer and Ptnrs., 88 Gray's Inn Rd, W.C.1.

Sutton. S.W. Metropolitan Regional Hospital Board accepted tender of £52,705 of Truett and Steel Ltd., 71 High St, Thornton Heath, for occupational therapy unit, Belmont Hospital.

Wakefield. Proposed: redevelopment of the Corn Exchange, Westgate, as a three-storey department store for Essoldo Circuits (Control) Ltd., 1 Jermyn St, S.W.1. 20-lane bowling centre at Denby Dale Rd for Brunswick Bowling Ltd.; architects: Munce and Kennedy, 133 University St, Belfast. Office block at Thornes Moor Rd for British Jeffrey-Diamond Ltd., of that address.

Walton-on-Thames. 42 shops, a supermarket and two office blocks on site of Walton Studios, planned for Park Investments Ltd., W.1; architect: R. Seifert, 34 Red Lion Sq, W.C.1.

Wimbledon. Factory extensions proposed by Whitton Precision Co., Bridge Wks, Durnford Rd, S.W.19; architects: Lush and Lester, 121 Kingsway, W.C.2.

Wisbech. £83,528 tender of H. J. Firman Ltd., Newark Rd, Peterborough, accepted by E. Anglian Regional Hospital Board for medical ward unit and other works, North Cambs Hospital, Wisbech.

Worthing. Proposed: multi-storey car park with ten-pin bowling centre under, on site west of Buckingham Rd, for Carstles Ltd.; architects: Fuller, Hall and Foulsham, 212 High Holborn, W.C.1. Extensive development at Portland Rd and Montague St planned for Marks and Spencer Ltd., Michael Hse, Baker St, W.1; architect: T. H. Mayer.

Yeovil. Proposed: multi-storey 350-bed hospital, Yeovil, for S.W. Regional Hospital Board, Bristol.

New Lighting Schemes

Blyth (Northumberland) B.C. To borrow £22,480 for first stage of gas conversion scheme for side streets.

Rochester C.C. Street lighting included in road works contract for added area, Earl estate, Stage 2. City Surveyor: J. A. Peel, 66 Maidstone Rd. Deposit £2 2s. Tenders by 6 Nov.

Surbiton B.C. To apply for £30,135 loan sanction for Stage Two of improvement scheme.

West Lancs R.D.C. £4,000 scheme for Southport New Rd, Tarleton; and £4,062 scheme of 54 units along Water La and Gravel La, Banks, have been approved.

Gazette Announcements

COMPANIES ACTS

Friokold Ltd. Liquidator: G. F. Morris, Inveresk Hse, 346 Strand, W.C.2, released as from 14 Sept.

Hillier-Copping and Co. Ltd. Liquidator: H. C. Hedges, Charterhouse Sq, E.C.1, released as from 25 Aug.

Ranelagh (London) Ltd. Release of liquidator: A. T. Cheek, Inveresk Hse, Strand, W.C.2, as from 29 Sept.

Spyrolex Ltd., 517 Uxbridge Rd, Hayes, Middx. Release of liquidator: G. F. Morris, Inveresk Hse, Strand, W.C.2, as from 21 Sept.

Byfleet Electronics Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 30 Oct. Persons intending to appear to notify Samuel Tonkin and Co., 3 Berners St, W.1, by 27 Oct.

Wildon and Co. Ltd. Mr. J. A. Freeman, 8 Manchester Rd, Bury, Lancs, appointed liquidator at extraordinary general meeting on 4 Oct. for the purpose of voluntarily winding-up.

Davis Bros (Electrical) Ltd. Winding-up order dated 9 Oct.

Eden Electrical Co. Ltd. Winding-up order dated 9 Oct.

Warden Electrics Ltd. Winding-up order dated 9 Oct.

Lowelectrix Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 30 Oct. Persons intending to appear to notify Batchelor, Fry Coulsdon and Burder, 222-225 Strand, W.C.2, by 4 p.m., 27 Oct.

Voluntary Liquidation

Wildon and Co. Ltd., 449 Hyde Rd, West Gorton, Manchester 12, and 315 London Rd, Hazel Grove, Cheshire, electrical appliance retailers. Liabilities of this company formed in Jan., 1958, totalled £5,780, including £2,728 to unsecured trade and expense creditors, and £3,000 in repect of loans, were shown in the statement of affairs at the statutory meeting of creditors held recently at Manchester. Assets were estimated to produce £1,388, leaving a deficiency of £4,392. A resolution was passed by creditors for the appointment of Mr J. A. Freeman, of 8 Manchester Rd, Bury, as liquidator.

Partnership Dissolved

Yorkshire. Walter Wharton Smith and John Leonard Wood, trading as Smith and Wood, electrical contractors, at Kilpin Hill, Heckmondwike, and at 82 Bradford Rd, Dewsbury.

BANKRUPTCY ACTS

Receiving Orders

Aylesbury. A. C. Hart, radio and electrical engineer, carrying on business at 255 High St, Berkhamsted. Receiving order dated 2 Oct.

Derby. R. James, radio, television and electrical retailer, formerly carrying on business in partnership as Fourways Electrical Services at 68 Carter La, Mansfield. Receiving order dated 11 Oct.

Bradford. M. C. Cornish, electrical dealer, formerly carrying on business at 1 Kipping La, Thornton. Receiving order dated 13 Oct.

Public Examinations

Bradford. E. M. Perrett, furniture and electrical retailer, carrying on business at 8 West La, Thornton. Public Examination: 10.30 a.m., 11 Dec., at County Court, Manor Row, Bradford.

Brighton. M. J. D. Jones, electrical appliance dealer, formerly carrying on business at 14 Blackstock Rd, N.4. Public examination: 10.30 a.m., 24 Nov., at Court Hse, Church St, Brighton 1.

Leeds. S. C. Aspell, a former director of Unique Products (Bridlington) Ltd., admitted gross liabilities of £24,976 and a deficiency of £8,828 at Leeds Bankruptcy Court on 17 Oct.

He formed Unique Products in 1959 to sell fluorescent lighting to householders employing 120 salesmen on a commission basis, but after nine months there were bad debts of £80,000. The finance company took over the company which subsequently went into voluntary liquidation. In December, 1959, he again traded as A. and A. Supplies Ltd. at Cambridge Rd, Leeds.

Newcastle upon Tyne. J. A. Parker, appliance dealer, formerly carrying on business as Household Refrigeration at Newcastle and Cullercoats and previously as Cardiff Vacuum Cleaner Co. at 23 St. Mary's St, Cardiff. Public Examination: 10.30 a.m., 5 Dec., at Court Hse, 56 Westgate Rd, Newcastle.

Appointment of Trustees

Bury St. Edmunds. J. W. Carrington and R. A. Fenn, electrical contractors and retailers, formerly carrying on business in partnership at 25a Angel Hill, Mr R. A. Paterson, Archdeacon's Hse, Northgate St, Ipswich, appointed trustee as from 10 Oct.

Stockton-on-Tees. A. Rose, electrical appliance dealer and contractor, carrying on business at 18 Roseberry Rd, Norton, and 31 Dovecoat St, Stockton-on-Tees. Mr W. Dent, 13 Albert Rd, Middlesbrough, appointed trustee as from 11 Oct.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Amoli-Cy. 816,027. Class 9. Automatic regulating apparatus for controlling voltage and frequency in dynamo machines, etc. Houchin Ltd., Garford Wks, Ashford, Kent.

Boving. B818,178. Class 7. Hydraulic turbines, etc. Boving and Co. Ltd., Villiers Hse, 41-47 Strand, W.C.2.

Compactal. 817,560. Class 9. Conductors o/h. Aluminium Wire and Cable Co. Ltd., Port Tennant Wks, Crymlyn Burrows Rd, Port Tennant, Glam.

Evotane. 821,832. Class 11. Lighting, etc., installations. Evode Ltd., Common Rd, Stafford.

Fluiverse. 818,402. Class 7. Mixing machines, etc. The Liner Concrete Machinery Co. Ltd., Park Rd Wks, Park Rd, Gateshead 8, Co. Durham.

Fyselytic. 810,661. Class 9. Electrolytic condensers. Plessey Co. Ltd., 56 Vicarage La, Ilford.

Isomelt and **Isonel.** 815,841 and 2. Class 17. Insulating varnish and enamel. Schenectady-Midland Ltd., Springfield Chemical Wks, Birmingham Rd, Oldbury, Birmingham.

"Kangol-Air." 822,691. Class 11. Appliances adaptable for use as hair-dryers or as space heaters, etc. Gillone Electric Ltd., "Rockstone Wks," Doman Rd, Camberley.

Loxal. 818,439. Class 6. Etched aluminium foil for the manufacture of electrolytic condensers. Tyne Chemical Co. Ltd., River Drive, South Shields, Co. Durham.

Metallux. 818,459. Class 9. Resistances, etc. **Semics.** 820,352. Class 9. Semiconducting devices, etc. The Plessey Co. Ltd., 1 Broad St Pl, E.C.2.

Remington Lektronic. 803,039. Class 8. Shaving instruments, etc. Remington Rand Ltd., 1-19 New Oxford St, W.C.1.

Rogack. 821,574. Class 11. Heating installations, etc. Mantle and Butterworth Ltd., Radiant Wks, Burnley Rd, Rawtenstall, Rossendale, Lancs.

Sealecto. B815,927. Class 9. Apparatus, etc. Sealectro Corpn., 610 Fayette Ave, Mamaroneck, N.Y., U.S.A.

Uniplug in design. B814,623. Class 9. Plugs, socket-outlets, etc. Uniplug (Proprietary) Ltd., 25 Davies St, Doornfontein, Johannesburg, S. Africa.

MEETINGS TO NOTE

THURSDAY, 26 OCT.

I.E.E. "A Comparison between Generation and Transmission Problems in Great Britain and France," P. M. J. Ailleret. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (S. Midlands). "Some Recent Developments in Electro Heat," E. May. Education Discussion Circle meeting, College of Technology, Gosta Green. 6.15 p.m.

I.E.E. (Southern). "A General Theory of Depreciation of Engineering Plant," D. Rudd. Joint meeting with the Southern branch of the Institution of Mechanical Engineers at the Farnborough Technical College. 6.30 p.m.

I.E.E. (N. Scotland). Sub-Centre Chairman's address, G. L. Doig. Electrical Engineering Dept., Queen's College, Dundee. 7 p.m.

INSTITUTION OF MECHANICAL ENGINEERS. Presidential address, Sir Kenneth Hague. 1 Birdcage Walk, S.W.1. 6 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Chester). "Radiation Pyrometry," T. Land. Stanley Palace, Watergate St. 7 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (W. Midlands). "Instruments for the First U.K. Scout Satellite," J. Sayers. Birmingham University. 6.15 p.m.

A.S.E.E. (East Kent). East and West Kent Branches Joint Annual Dinner. Royal Star Hotel, Maidstone.

A.S.E.E. (South London). "Navigation Lights: Manufacturing and Servicing," A. F. Burn. Greyhound Hotel, Croydon, Surrey. 8 p.m.

A.S.E.E. (Northern Ireland). "The Art and Science of Lighting," W. M. Pierce. Central Hall, Rosemary St, Belfast.

A.S.E.E. (Southampton). "The Practical Application of the New I.E.S. Code," P. G. Merritt. Polygon Hotel, Southampton. 8 p.m.

FRIDAY, 27 OCT.

I.E.E. (E. Midlands) Kettering District dance. George Hotel, Kettering. 9 p.m.

I.E.E. (Southern). "The Psychology of Study," C. A. Mace. South Dorset Technical College, Weymouth. 6.30 p.m.

I.E.E. (Southern). "Safety in the Utilisation of Electricity," S. J. Emerson. S.E.B. Showrooms, Newport, I.W. 6.30 p.m.

I.E.E. (N. Scotland). Sub-Centre Chairman's address, G. L. Doig. Robert Gordon's Technical College, Aberdeen. 7.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Scottish). "The Variable Area Flowmeter Sheds its Limitations," N. Nixon. Scottish Building Centre, Sauchiehall St, Glasgow. 7.15 p.m.

A.S.E.E. (Coventry and District). "The Revision of British Standards and their Effect on Motor Applications," F. T. Bartho. The Conservative Rooms, 16 Queens Rd, Coventry. 8 p.m.

A.S.E.E. (Stoke and Crewe). "The Lighting of Offices," D. Whipp. Royal Hotel, Crewe. 7.30 p.m.

INSTITUTION OF ELECTRONICS (Manchester). "Instrumentation Magnetic Tape Recording," T. D. Dalzell, and "Digital Magnetic Recording Techniques," G. C. Ziman. Reynolds Hall, Manchester College of Science and Technology. 7 p.m.

MONDAY, 30 OCT.

INSTITUTION OF MECHANICAL ENGINEERS (Thermodynamics and Fluid Mechanics Gp). Discussion: "The Extent to Which Data Can be Made Available for Engineering Design." 1 Birdcage Walk, Westminster, S.W.1. 6 p.m.

TUESDAY, 31 OCT.

I.E.E. (E. Midlands Electronics and Control Group). "Trends in Automation," D. R. Hardy. Lecture Theatre, College of Further Education, Greenclose La, Loughborough. 6.30 p.m.

B.E.A.M.A. Annual Dinner. Grosvenor Hse, Park La.

CRABTREE LECTURE. "Modern Methods of Circuit Protection and Control," J. A. Robbins. Hotel Russell, W.C.1. 6.30 p.m., repeated on 1 Nov.

WEDNESDAY, 1 NOV.

I.E.E. "Generation of Power in Satellites," H. J. H. Sketch. Joint meeting with R.Ae.S., Savoy Pl, W.C.2. 6 p.m.

I.E.E. (N.E.). "The Potentialities of Artificial Earth Satellites for Radiocommunication," W. J. Bray, and "The Interdependence of Civil and Electrical Engineering on the Continent Today," F. C. Greenfield. Conservative Club, Pilgrim St, Newcastle. 7 p.m.

I.E.E. (Southern). "Brushless Variable-speed Induction Motors Using Phase-shift Control," Prof F. C. Williams, E. R. Laithwaite, J. F. Eastham and W. Farrer. University, Southampton. 7 p.m.

I.E.E. (S.W. Scotland). "Somes Notes on the Electrical Requirements of Cargo Docks," E. R. Radway. Institution of Engineers and Shipbuilders, 39 Elmbank Cres, Glasgow C.2. 6 p.m.

I.E.E. (Tees-side). "Thermistors—Their Theory, Manufacture and Application," R. W. A. Scarr and R. A. Setterington. Cleveland Scientific and Technical Institution, Middlesbrough. 6.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (S. Yorks). "Modern Instrumentation Applied to Gas Distribution," H. S. Horn. Metropole Hotel, Leeds.

I.E.S. (Edinburgh). "The Association of Light and Colour," A. D. Charters. Y.M.C.A., 14 South St. Andrew St. 6.15 p.m.

I.E.S. (Newcastle upon Tyne Centre). Symposium on Office Lighting. J. K. Boud and E. B. Sawyer. Room B7, The Percy Bldg, King's College, Queen Victoria Rd. 6.15 p.m.

I.E.S. (Swansea Group). "The New I.E.S. Code," W. E. Harper. Demonstration Theatre, South Wales E.B., The Kingsway. 6 p.m.

A.S.E.E. (Manchester). "Static Switching Control Systems," B. A. W. Midgley. N.W.E.B. Service Centre Theatre, Town Hall Extension, St. Peter's Sq. 7.30 p.m.

A.S.E.E. (N. London). "Electrical Aspects of Process Control," W. C. Hankins. Wood Green Civic Centre, N.22. 8 p.m.

A.S.E.E. (Preston). "Industrial and Commercial Lighting Fittings," A. G. Smith. Farmer's Arms Hotel, Market St. 7.30 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Education and Training Committee). "The Teaching of the Theory of Transistors and Semiconductor Devices," Prof. M. R. Gavin. London School of Hygiene and Tropical Medicine, Keppel St, W.C.1. 6 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (W. Midlands). "Electronics in Biological Engineering," W. J. Perkins. Wolverhampton College of Technology. 7.15 p.m.

THURSDAY, 2 NOV.

I.E.E. "Acoustics and the Electrical Engineer," T. Somerville. Savoy Pl, W.C.2. 6 p.m.

I.E.E. (N. Midlands). "Blaenau Ffestiniog and other Medium-head Pumped Storage Schemes in Great Britain," H. Headland. Joint meeting with Yorkshire Assoc. of the Inst. of C.E. and Yorkshire branch of the Inst. Mech. Eng. Chemistry Lecture Theatre, Leeds University. 6.30 p.m.

INSTITUTION OF MECHANICAL ENGINEERS (Process Eng., Refrigeration, Ventilation and Vacuum Plant Group). Discussion: "Problems of Maintenance in the Petroleum and Kindred Industries." 1 Birdcage Walk, Westminster, S.W.1. 6 p.m.

I.E.S. (Cardiff). "The New I.E.S. Code," Dr W. E. Harper. Bowchier Hall.

I.E.S. (Nottingham Centre). "Traffic Signals," B. M. Cobbe. Electricity Centre, Carrington St. 6 p.m.

A.S.E.E. (Brighton, Hove). "Electricity Supply Regulations." Cricketers' Hotel, Black Lion St, Brighton 1. 7.30 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (N. Western). "V.H.F. Communications Receivers and Transmitters Using Transistors," A. J. Rees and D. C. Carey. Reynolds Hall, Manchester College of Science and Technology. 7 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (S. Midlands). "Transistor Portables," R. A. Lampitt. Winter Gardens, Malvern. 7 p.m.

INSTITUTION OF PLANT ENGINEERS (Birmingham). "Electrification of British Railways—Crewe to London." Hotel Leofric, Coventry. 7.30 p.m.

CHELMSFORD ENGINEERING SOCIETY. "Lighting of Niagara Falls," T. G. Proctor and D. J. Reed. Social Hall, Crompton's.

FRIDAY, 3 NOV.

I.E.E. (Medical Electronics Discussion Group). Discussion: "Information Theory in Relation to Biology." Savoy Pl, W.C.2. 6 p.m.

A.S.E.E. (Liverpool and District). "Current Practice and Recent Trends in Cable Joints and Terminations up to 11 kV." H. Flack. Industrial Development Centre, M.A.N.W.E.B., Paradise St. 7.30 p.m.

A.S.E.E. (Wolverhampton and District). Branch dinner-dance at Woolpack Restaurant, Wolverhampton.

I.E.E. (N.E. Graduates and Students). "The Hownsgill Plate Mill—Its Construction and Operation," M. H. Hepworth. Joint meeting with the Graduate and Student Sections of the Institution of Civil Engineers and the Institution of Mechanical Engineers. Grey Hall, King's College, Newcastle upon Tyne. 6.30 p.m.

INSTITUTE OF PHYSICS AND PHYSICAL SOCIETY (S. Western Branch). "The Mossbauer Effect," Dr G. Lomer. The University, Exeter. 7 p.m.

IPSWICH AND DISTRICT ELECTRICAL ASSOCIATION. Ladies' Ball at Royal Hotel, Clacton-on-Sea.

SATURDAY, 4 NOV.

I.E.E. (London Graduates and Students). Joint Students' Dance at Carlton Rooms, W.9. 7.30 p.m.

MONDAY, 6 NOV.

I.E.E. (Electronics and Communications Section). "The General Problems of F.M. Multichannel Communications," R. G. Medhurst. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (E. Anglian). "Are Aircraft Electrics Too Complicated?" H. Zeffert. Joint meeting with the Cambridge branch of the Royal Aeronautical Society at the College of Arts and Technology, Cambridge. 6.30 p.m.

I.E.E. (Mersey and N. Wales). Annual dinner. Grosvenor Hotel, Chester. 6.30 for 7 p.m.

I.E.E. (N.E. Measurement and Electronics Group). "Microminiaturization," L. J. Ward. Rutherford College of Technology, Northumberland Rd, Newcastle upon Tyne. 6.15 p.m.

I.E.E. (S. Midlands). "A Dynamic Model for Studying the Behaviour of the Overhead Equipment Used in Electric Railway Traction," D. S. Farr, H. C. Hall and A. L. Williams. James Watt Memorial Institute, Birmingham. 6.30 p.m.

INSTITUTION OF MECHANICAL ENGINEERS (Manipulative and Mechanical Handling Machinery Group). Discussion: "Port Handling of Cargoes—Are Dockside Cranes Out-moded?" 1 Birdcage Walk, Westminster, S.W.1. 6 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Control Section). "Semiconductor Diodes and Rectifiers in Control Engineering," P. R. Wyman; and "The Transistor in Control Engineering," Dr G. D. Bergman. Manson Hse, 26 Portland Pl, W.1. 6.30 p.m.

E.P.E.A. (London Technical Group). "Modern Power Plants and Operating Practices—Detroit Edison Co., U.S.A.," J. R. Taylor. Tudor Room, Caxton Hall, S.W.1. 6.30 p.m.

TUESDAY, 7 NOV.

I.E.E. (N. Midlands). "Technical and Economical Aspects of the Supply of Reactive Power in England and Wales," W. Casson and H. J. Sheppard. Leeds and County Conservative Club, South Parade, Leeds 1. 6.30 p.m.

I.E.E. (N.E.). "Silicon Power Rectifiers," A. J. Blundell, A. E. Garside, R. G. Hibberd and I. Williams. Workington College of Further Education. 7 p.m.

I.E.E. (N.W. Utilisation Group). "Some Recent Developments in Oscillating Machines," F. C. Williams. Electrical Engineering Laboratories, Manchester University. 6.15 p.m.

I.E.E. (S.E. Scotland). "Brushless Variable-speed Induction Motors Using Phase-shift Control," Prof F. C. Williams, E. R. Laithwaite, J. F. Eastham and W. Farrer. Carlton Hotel, North Bridge, Edinburgh. 7 p.m.

INSTITUTION OF MECHANICAL ENGINEERS (Lubrication and Wear Group). Discussion: "Refrigeration Lubrication." 1 Birdcage Walk, Westminster, S.W.1. 6 p.m.

INSTITUTION OF CIVIL ENGINEERS. Presidential address, Sir George McNaughton. Gt. George St, S.W.1. 5.30 p.m.

LIGHTMONGERS' SOCIETY. A.G.M. and dinner at Livery Hall, Guildhall, London.

INSTITUTION OF PLANT ENGINEERS (London). "Pilot-scale Research Work at the D.S.I.R. Warren Spring Laboratory," S. H. Clarke, R.S.A. John Adam St, W.C.2. 7 p.m.

INSTITUTION OF PLANT ENGINEERS (Peterborough). "Application of Modern Industrial Switch and Control Gear," P. C. Belton. White Lion Hotel, Church St. 7.30 p.m.

WEDNESDAY, 8 NOV.

I.E.E. (Measurement and Control). Conference on Non-destructive Testing in Electrical Engineering until 10 Nov. Savoy Pl, W.C.2.

I.E.E. (Oxford). "Unconventional Methods of Energy Conversion," P. D. Dunn. Demonstration Room, Southern E.B., 37 George St, Oxford. 7 p.m.

I.E.E. (S.W. Scotland). "Education: Why Bother?" K. R. Sturley. Institution of Engineers and Shipbuilders, 39 Elmbank Cres, Glasgow C.2. 6 p.m.

I.E.E. (Southern). "The Protection of High Voltage Insulators from Power Arc Damage," A. E. Guile. S.E.B. Showrooms, 17 New Canal, Salisbury. 6.30 p.m.

I.E.E. (Western Utilisation Group). "Silicon Power Rectifiers," A. J. Blundell, A. E. Garside, R. G. Hibberd and I. Williams. S.W.E.B. Demonstration Theatre, Bath. 6 p.m.

INSTITUTION OF MECHANICAL ENGINEERS. Nominated lecture: "Gear-tooth Contact Phenomena," Dr H. E. Merritt. 1 Birdcage Walk, Westminster, S.W.1. 6 p.m.

I.E.S. (Bath and Bristol Centre). Joint meeting with British Lighting Council and Bristol and Somerset Society of Architects. Royal West of England School of Architecture, Gt. George St, Bristol.

Now then, Mr. Jones, how long this time?

Pushed for time, pushed for space, pushed about generally, poor Mr. Jones. But he doesn't do too badly; new sports car, expensive camera, stereo at home . . . and no doubt most of them, like the parking meter, making good use of pressure die castings. Pressure die castings are inseparable from modern living and Wolverhampton Die Casting offer manufacturers high quality components at remarkably low cost in a variety of pleasing finishes. And the massive scale of production they can achieve helps everyone to enjoy a higher standard of living. Wolverhampton pressure die castings in zinc and aluminium point to progress in a big way. Your enquiries would be welcomed.

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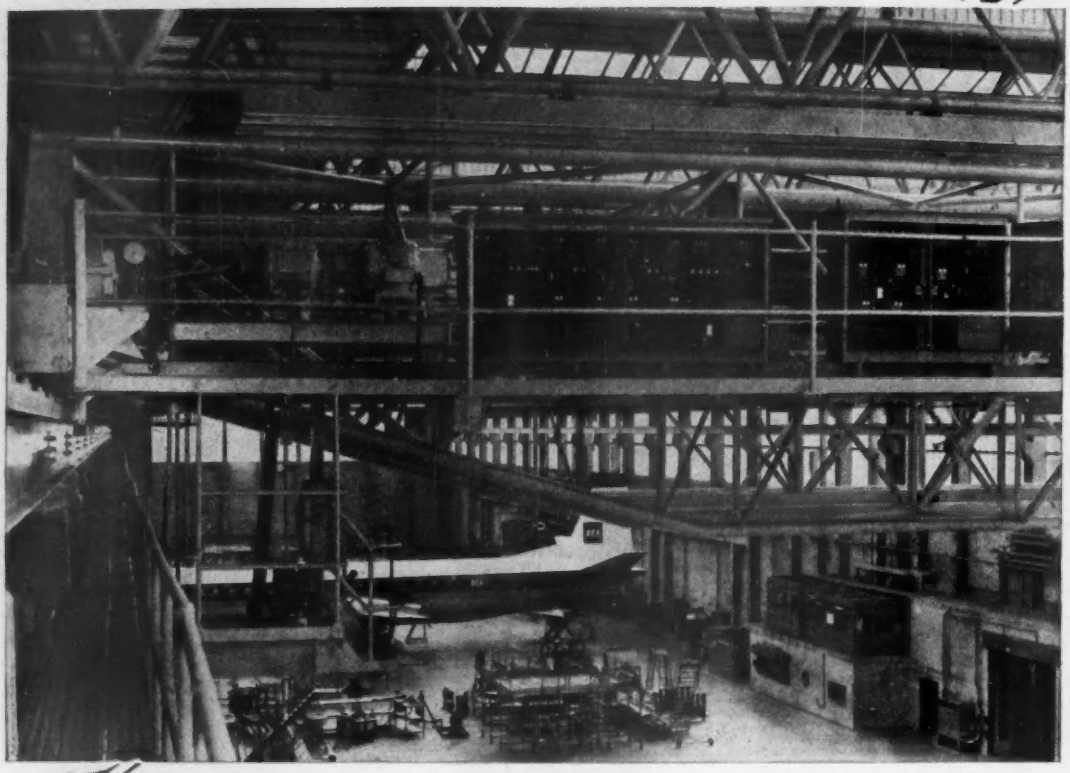

BEA ENGINEERING BASE, LONDON (Heathrow) AIRPORT

RELIABILITY must always be the main consideration in air travel, not only from the safety point of view but also from the economics of aircraft maintenance.

The combination of E.M.B. Contactor Control Gear on this carruthers crane at the B.E.A. Engineering Base at London Airport takes care of this aspect so far as crane handling is concerned.

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ENGLAND

CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

CITY OF HEREFORD

Electrical Installation to 74 Traditional Houses on Newton Farm 6 Site, Hereford

TENDERS are invited for the wiring for electricity to 74 traditional houses on Newton Farm 6 Site, Hereford.

Plan, Specification and Form of Tender may be obtained from the City Architect, Town Hall, Hereford, upon deposit of £1 1s (returnable following the submission of a bona fide tender and return of all documents).

Tenders should be returned in the envelope provided and endorsed "74 houses—Newton Farm 6," to reach the undersigned not later than 12 noon on Friday, 24 Nov., 1961.

J. A. WESTON,
Town Clerk.

Town Hall,
Hereford.
October, 1961. (C 421)

CITY AND COUNTY OF NORWICH

Improvement of Street Lighting for the Year Ending 31 March, 1962

STREET lighting schemes are to be carried out in the City on Hotblack Rd, Magdalen St (part), Chapelfield Rd, St. Clements Hill and Silver Rd.

Contractors who are competent to carry out supply and erection of street lighting equipment and electrical installation works and who wish to submit tenders for the various contracts which will be required throughout the year, are invited to submit their names to the City Engineer, City Hall, Norwich, NOR 01A, within one week from the date of this advertisement. (C 427)

CITY OF HEREFORD

Electrical Installation to 72 Traditional Houses on Newton Farm 7 site, Hereford

TENDERS are invited for the wiring for electricity to 72 traditional houses on Newton Farm 7 site, Hereford.

Plan, specifications and form of tender may be obtained from the City Architect, Town Hall, Hereford, upon deposit of £1 1s (returnable following the submission of a bona fide tender and return of all documents).

Tenders should be returned in the envelope provided and endorsed "72 Houses—Newton Farm 7" to reach the undersigned not later than 12 noon on Friday, 24 Nov., 1961.

J. A. WESTON,
Town Clerk.

Town Hall,
Hereford.
October, 1961. (C 422)

APPOINTMENTS VACANT

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

SHIFT CHARGE ENGINEER

REQUIRED at Drakelow "B" Power Station, Staffs. N.J.B. service conditions,

continued in next column

continued from previous column

superannuable appointment, salary within Schedule A, Grade L.6, £1,535/£1,720 per annum, plus 10% shift allowance.

A sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear in a large modern power station are required, also a knowledge of P.F. firing. The station is one of advanced design. Appropriate qualifications an advantage.

Apply, quoting Vacancy No. 234/61 MR on Form AE6, available from the Station Superintendent, Drakelow Power Station, nr. Burton-on-Trent, Staffs, by 6 Nov., 1961. (C 401)

THE SOUTH WALES ELECTRICITY BOARD

DISTRICT MANAGER

PONTYPRIDD/CAERPHILLY DISTRICT

APPLICATIONS are invited for the post of Manager of the Pontypridd/Caerphilly District in the Cardiff and East Central Area of the Board. The District has an estimated population of 90,000 with some 26,000 consumers. Although the District is to a large extent concerned with coal mining, both Pontypridd and Caerphilly are important commercial centres and the District also includes the Treforest Trading Estate, serving a variety of industries.

Experience in a senior position in the Electricity Supply Industry is essential and applicants should possess a recognised professional qualification.

The salary for the position will be in accordance with Class C, Grade 5, of the National Joint Managerial and Higher Executive Grades Committee, namely, £2,170/£2,380 per annum.

Applications should be sent to the undersigned at St. Mellons, Cardiff, to arrive not later than Friday, 17 Nov., 1961.

Please quote reference 133/61/ET endorsing envelope "District Manager—Pontypridd/Caerphilly."

R. G. WILLIAMS,
Secretary.
(C 417)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT ENGINEER (RELIEF)

REQUIRED at Walsall Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade J.12, £890/£1,015 per annum.

The successful applicant will be expected to carry out shift relief duties to the Control Engineers and when not so employed will be available to undertake duties in the maintenance and operation departments. Shift allowance as laid down in the N.J.B. Agreement will be paid when shift duties are worked.

Applicants should have received a sound technical training and appropriate qualifications will be an advantage.

Apply, quoting Vacancy No. 240/61 MR, on form AE6, available from the Station Superintendent, Walsall Power Station, Reedswood La, Walsall, Staffs, to whom they should be returned when completed not later than 6 Nov., 1961. (C 424)

SOUTHERN ELECTRICITY BOARD

QUANTITY SURVEYOR

SUB-AREA Engineering Department (Civil Engineering Section) of No. 1 (Southall) Sub-Area, located at Waterloo Rd, Uxbridge, Middlesex. Salary: N.J.B. Class M, Grade 10 (£1,325/£1,460 per annum, inclusive of London Allowance). N.J.B. Conditions of Service.

Candidates, who should be members of the Chartered Surveyors' Institution, or have equivalent qualifications, must be fully experienced in the writing of specifications, the working up and preparation of bills of quantities, be capable of settling contractors' accounts and preparing preliminary estimates for projected schemes.

Applications on forms obtainable from the Sub-Area Secretary, 2-6 Windmill La, Southall, Middlesex, and returned to him, quoting Z.1421, not later than 6 Nov., 1961.

ASSISTANT ENGINEER

(MAINTENANCE AND OPERATION)

Melksham District of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class G, Grade 9 (£965/£1,090 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1374, not later than 6 Nov., 1961.

ASSISTANT ENGINEER (PLANNING)

Melksham District of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class G, Grade 9 (£965/£1,090 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist the Planning Engineer in the preparation of schemes and estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks. Applicants should possess suitable technical qualifications.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1424, not later than 6 Nov., 1961.

ASSISTANT ENGINEER (PLANNING)

Aldershot District of No. 3 (Portsmouth) Sub-Area. Salary: N.J.B. Class H, Grade 10 (£965/£1,090 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist the Planning Engineer in the preparation of schemes and estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks. Applicants should possess suitable technical qualifications.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton La, Cosham, Portsmouth, and returned to him, quoting Z.1425, not later than 6 Nov., 1961.

SENIOR SHOWROOM ASSISTANT

Bournemouth District of No. 4 (Bournemouth) Sub-Area. Salary: N.J.C. Grade 3 (£780 x £25—£880 per annum). N.J.C. Conditions of Service.

Applicants should have experience in all showroom duties and a sound knowledge of domestic apparatus, sales procedure, application of tariffs and consumer service. Candidates should be capable of controlling staff.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him, quoting Z.1402, not later than 6 Nov., 1961.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. (C 420)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 46s. per inch, and all other classified advertisements at 3s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

No. 1 Sub-Area

FITTERS (ELECTRICAL)

REQUIRED in the Liverpool North, South and Central Districts.

Rate of pay 66.75d per hour (42-hour, five-day week). N.J.I.C. conditions. Pension Scheme.

Applicants should be experienced in the erection of 33 kV and 11 kV switchgear, and also have a knowledge of general substation construction work.

Applications in writing should be forwarded to the Manager, No. 1 Sub-Area, 24 Hatton Garden, Liverpool 3.

Closing date: 3 Nov., 1961. (C 389)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS are invited for the following superannuable N.J.B. Schedule A appointments in the South Wales Division:

ASSISTANT SHIFT CHARGE ENGINEER
USKMOUTH "B" POWER STATION
WEST NASH, Nr. NEWPORT, MON
Vacancy No. 281/ET/61.

Salary: Class K, Grade 8, Scale 11, £1,275/£1,410 per annum.

ASSISTANT SHIFT CHARGE ENGINEER
USKMOUTH "A" POWER STATION
WEST NASH, Nr. NEWPORT, MON
Vacancy No. 282/ET/61.

Salary: Class K, Grade 8, Scale 11, £1,275/£1,410 per annum.

STATION SHIFT CONTROL ENGINEER
UPPER BOAT POWER STATION
Nr. PONTYPRIDD, GLAM
Vacancy No. 283/ET/61.

Salary: Class H, Grade 10, Scale 7, £965/£1,090 per annum.

Applicants for the above posts should possess H.N.C. or equivalent qualifications and have had operating experience in a modern power station.

10% shift allowance applies in each case.

ASSISTANT MAINTENANCE ENGINEER
(MECHANICAL)
USKMOUTH "A" POWER STATION
WEST NASH, Nr. NEWPORT, MON
Vacancy No. 284/ET/61.

Salary: Class K, Grade 8, Scale 11, £1,275/£1,410 per annum.

Applicants should possess H.N.C. or equivalent qualifications and have had experience of power station mechanical maintenance, including turbines, boilers and associated plant.

SECOND ASSISTANT ENGINEER
(OPERATIONAL RESEARCH SECTION)
GENERATION DEPARTMENT
AT DIVISIONAL HEADQUARTERS
Vacancy No. 285/ET/61.

Salary: Class K, Grade 5, Scale 14, £1,415/£1,720 per annum.

Applicants should hold a recognised qualification in engineering or science and be able to apply research techniques to problems involving the efficient utilisation of resources in the general field of power station operation and maintenance.

The person appointed will be in charge of a small team and will be expected to direct a complete project. Clerical and statistical services are available in support.

Previous experience in Operational Research would be an advantage. Suitable applicants from other fields will be considered.

Special application forms obtainable from Divisional Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 9 Nov., 1961. (C 383)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Region

REGIONAL ELECTRICAL DEPARTMENT

APPLICATIONS are invited for the positions of

THREE FOURTH ASSISTANT ENGINEERS
(MEASUREMENTS)

in the Technical Branch of the Regional Electrical Department as follows:

(a) One Engineer to be based at Newcastle upon Tyne to assist in site maintenance and testing of electrical measuring apparatus.

The appointment will be made at National Joint Board, Grade 10, in the Regional Classification, Class K (£980/£1,245 per annum).

(b) Two Engineers to be based at Leeds to assist in maintenance and testing of electrical measuring apparatus in the Regional Testing Laboratory.

The appointments will be made at National Joint Board, Grade 11, in the Regional Classification, Class K (£900/£1,165 per annum).

Applicants should preferably have had experience in the testing and calibration of precision polyphase and summation metering equipments associated with H.V. bulk supplies, indicating instruments and laboratory standardisation, and possess a Higher National Certificate in Electrical Engineering or its equivalent.

Applications stating the post applied for should be made on Form AE6, obtainable from the Regional Personnel Officer, Central Electricity Generating Board, North Eastern Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 8 Nov., 1961. (C 395)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Birmingham

GENERAL ASSISTANT DISTRICT ENGINEER
(SOUTH WEST DISTRICT)

Experience necessary in the construction, operation and maintenance of large H.V. and M.V. underground distribution systems. Technical qualifications desirable. Salary within the ranges £825/£940, £890/£1,015, £965/£1,090, £1,040/£1,165 or £1,115/£1,245 per annum (N.J.B. Grades K14/10), according to qualifications and experience. Apply, by letter, within 14 days, stating age, experience, present position and salary to Emil Braathen, Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

Central Gloucestershire

MANAGER (AREA OFFICE)

Applicants, who should hold appropriate qualifications, must have had extensive administrative experience within the Electricity Supply Industry. Salary: £3,270/£3,515 per annum (N.J.M. Class C, Grade 10). Applications should be forwarded within ten days to the Secretary, Midlands Electricity Board, Mucklow Hill, Halesowen, nr. Birmingham.

DISTRICT SENIOR CLERK
(SEVERN VALE DISTRICT AT CHIPPING SODBURY)

Applicants should have experience of clerical and accounting procedures and the control of staff. A professional qualification would be an advantage. Duties include responsibility for consumers' records and associated matters, stores, contracting, costing and invoicing, cash collection, wages payment, meter reading and the general clerical work of the District Office. Salary:

continued in next column

continued from previous column

£1,150/£1,240 per annum (N.J.C. Grade 6). Applications, by letter, stating age, qualifications and present position, to be forwarded, within 14 days, to Mr S. Raybould, Area Manager, Midlands Electricity Board, Eastern Ave, Gloucester.

North Staffs

SALES REPRESENTATIVE (MALE)
(STOKE CENTRAL DISTRICT)

Duties will include advice to consumers on matters concerning supply, tariffs, apparatus sales, wiring and installation thereof. The applicant selected will also be required to assist from time to time in the District Service Centre, and this will include all-day Saturday duties. Salary: £600/£700 per annum (N.J.C. Grade 1). A training scheme is in operation and salary is paid during training. Apply, by letter, within ten days, stating age, qualifications, experience, present position and salary, to Mr C. C. Pimble, Area Manager, Midlands Electricity Board, 234 Victoria Rd, Fenton, Stoke-on-Trent.

Wolverhampton

THIRD ASSISTANT DISTRICT ENGINEER
(CANNOCK)

Applicants should have had a sound technical training and experience in the construction, operation and maintenance of overhead and underground distribution systems. Technical qualifications desirable. Salary: £890/£1,015 per annum (N.J.B. Grade F.9).

GENERAL ASSISTANT DISTRICT
COMMERCIAL ENGINEER (WALSALL)

Applicants should have had a sound technical training and experience in all branches of commercial work. Technical qualifications desirable. Salary within the ranges £670/£750, £715/£805, £765/£870, £825/£940 (N.J.B. Grades H.15, H.14, H.13 or H.12), according to qualifications and experience.

Apply, by letter, within 14 days, stating age, qualifications, experience, present position and salary, to Mr D. Holt, Area Manager, Midlands Electricity Board, 83 Darlington St, Wolverhampton.

F. W. CATER,
Secretary.
(C 397)

LONDON ELECTRICITY BOARD

ASSISTANT QUANTITY SURVEYORS (2)

APPLICATIONS are invited for the above positions in the Construction Branch of the Chief Engineer's Department at Lesco Hse, Stamford St, London S.E.1.

Applicants should have had working up experience in a Quantity Surveyor's office, and will work under the direction of a Chartered Quantity Surveyor.

The post is graded under Schedule A of the National Joint Board Agreement, Class K Area, as Grade II, and the commencing salary will be in the range of £950/£1,215 per annum, inclusive of London Allowance.

Application forms are obtainable from the Construction Engineer, Lesco Hse, Stamford St, S.E.1. Please quote Ref.: PER/V/3443/T. (C 390)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT ENGINEER (OPERATION)

REQUIRED at Drakelow "A" Power Station, nr. Burton-on-Trent, Staffs. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade J.10. £1,040/£1,165 per annum, plus 10% for shift duties.

Applicants should have received a sound technical training and practical experience in the operation of steam generating plant and main switchgear, and a knowledge of P.F. firing is desirable. Appropriate technical qualifications would be an advantage.

Apply, quoting Vacancy No. 235/61 MR on Form AE6, available from the Station Superintendent, Drakelow Power Station, nr. Burton-on-Trent, Staffs, by 6 Nov., 1961. (C 399)

CENTRAL ELECTRICITY BOARD OF THE FEDERATION OF MALAYA

CAMERON HIGHLANDS HYDRO ELECTRIC SCHEME

JOR POWER STATION

APPOINTMENT OF MECHANICAL ENGINEER

APPLICATIONS are invited for appointment of Mechanical Engineer, Jor Hydro Electric Station, Cameron Highlands, Malaya.

Applicants should normally be between the ages of 30 and 50. They should preferably be Corporate Members or have exemption from the Associate Membership Examination of the United Kingdom Institution of Mechanical Engineers, or possess a Diploma/Certificate of appropriate standard from a recognised Commonwealth Mechanical Engineering body.

Applicants should have had at least ten years' maintenance experience in large power stations, at least five years of which have been spent in hydro electric installations with attainment of responsibility.

Jor Power Station is an underground installation which will be commissioned with 2 x 25 MW Pelton wheel generating sets, and when completed will have a total of four such sets.

The duties of the post carry responsibility for undertaking the maintenance of all mechanical plant associated with the above stations and two smaller ones in the same scheme.

The appointment is on contract for three years in the first place, but there is a possibility of a further contract being offered.

The salary for the contract now offered will be between £2,250/£3,300 per annum according to qualifications, experience and marital commitments. Payment would normally be made monthly in Malaya in Malayan dollars at a fixed rate of exchange of 2s 4d to $1 Malayan, but at the option of the officer an amount of up to one-third of the total salary may be paid in pounds sterling in his country of domicile.

The salaries offered are all inclusive, but the terms of service include the provision of housing at a nominal rent, free medical attention, a motor car allowance where the work necessitates the use of a vehicle, and terminal leave on full pay at the end of the contract.

First class passages to Malaya and return to his country of domicile will be provided for the officer, his wife and children up to the age of 16 years, subject to a maximum of three children.

If a married man leaves his family in his country of domicile, free passages for a family reunion in Malaya during the contract will be provided on request, or alternatively, the officer may elect to go on Annual Leave to his country of domicile.

Apply to CROWN AGENTS, 4 Millbank, London S.W.1, for application form and further particulars, stating age, name, brief details of qualifications and experience and quoting reference M2A/51455/EE. (C 404)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SENIOR ASSISTANT ENGINEER

(PLANNING)

REQUIRED in the Board's No. 4 Sub-Area. Salary within range £1,795/£1,950 per annum (N.J.B. L.4, Scale 16).

Applicants should possess sufficient technical qualifications to enable them to become Chartered Electrical Engineers, and have an extensive knowledge of distribution systems at all voltages and a good understanding of the associated economic factors.

Appointment subject to medical examination. Pension Scheme.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity Hse, Rhostyllen, nr. Wrexham.

Closing date: 10 Nov., 1961. (C 419)

AIR MINISTRY WORKS DEPARTMENT

MECHANICAL AND ELECTRICAL ENGINEERS

OPPORTUNITIES OVERSEAS

APPLICATIONS invited from Assistant Mechanical and Electrical Engineers for appointments initially in overseas areas on tours of 2 or 3 years' duration according to location. Completion of tour is followed by duties in U.K. with every opportunity for further tours overseas.

SALARY overseas includes FOREIGN SERVICE ALLOWANCE, which varies according to location and whether single or married. For example, total emoluments in Cyprus at age 25, range at present from £1,316/£1,766 (single) and from £1,676/£2,301 (married). Annual increments to age 38 with a special increase of £95 p.a. for fully qualified men after 2 years' service.

DUTIES comprise design, construction and maintenance of installations in workshops and on airfields, radar stations and maintenance units, etc.

QUALS. At least the qualifying examination for corporate membership (or exemption) of the Institution of Electrical Engineers or the Institution of Mechanical Engineers (with appreciable electrical engineering experience) and not less than 2 years' professional experience.

CONDITIONS. Expatriation and kit allowances (£85/£140 approx.). Free passage overseas for self and later for family when accommodation arranged. Free medical and child educational arrangements. Five-day week with paid annual leave initially 4 weeks and 2 days. Paid sick leave within certain limits.

PROSPECTS. Appointments are non-pensionable but retirement/resignation gratuity payable after 5 years' or more service. Excellent opportunities of obtaining permanent pensionable post (with all service counting) and of advancement to posts in the higher grades which number 180 approx. Higher grade salaries vary between £1,456 and £3,715 p.a. and vacancies are, as a rule, filled by promotion of existing staff.

Applicants, who must be natural born British subjects under 35 years of age, should write to Air Ministry Works Department (W.G.d), Lacon Hse, Theobalds Rd, London W.C.1. Selection will be by interview in London and certain expenses will be reimbursed. (C 394)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

North Thames Division

APPLICATIONS are invited for the following appointment:

ASSISTANT ENGINEERS (PLANT)

WEST THURROCK GENERATING STATION

GRAYS, ESSEX

(S.V. No. 1553)

Salary: N.J.B. Class M, Grade 10, Scale II, £1,325/£1,460 per annum, inclusive of London Weighting, plus 10% Shift Allowance.

The duties associated with these posts will be concerned with the Operational Control of 2 x 200 MW and 3 x 300 MW Boiler/Turbine Units either in a Centralised Control Room or on the plant itself.

Applicants should have had previous Generating Station experience and have technical qualifications leading to Corporate Membership of one or more of the recognised Engineering Institutions.

Applications, quoting Reference S.V. No. 1553, stating age, qualifications, experience and present position should be sent to the Assistant Regional Personnel Officer, Central Electricity Generating Board, North Thames Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, by 11 Nov., 1961.

F. W. SKELCHER,
Assistant Regional Director.
(C 391)

YORKSHIRE ELECTRICITY BOARD

Head Office:

SECOND ASSISTANT ENGINEER

(SYSTEM DESIGN)

APPLICANTS should have considerable experience in the planning, construction and operation of distribution systems working at 11 kV and lower voltages in urban and rural areas. Experience of 66 kV, 33 kV or lower voltage systems supplying heavy industrial loads is desirable.

Salary: N.J.B. Class K, Grade 5 (transitional to Scale 14), £1,415/£1,720 per annum.

Applications, together with the names of two referees, should be sent to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds, not later than 10 Nov., 1961.

No. 1 (Bradford) Sub-Area

THIRD ASSISTANT ENGINEER

(OPERATION AND MAINTENANCE)

(TWO POSTS)

Applicants should be fully experienced in the operation and maintenance of overhead and underground transmission, and distribution systems, operating at voltages up to 66 kV, substation plant and ancillary equipment. The successful applicants will be required to perform standby duties.

Salary: N.J.B. Class L, Grade 10 (Scale 10), £1,190/£1,325 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford 1, not later than 10 Nov., 1961.

No. 2 (Huddersfield) Sub-Area

THIRD ASSISTANT ENGINEER

(DISTRIBUTION DESIGN)

Applicants should have had experience in the design, construction and operation of h.v. and m.v. underground and overhead distribution systems, and should be capable of preparing schemes for extending the various distribution systems, together with the necessary technical reports and estimates.

Salary: N.J.B. Class L, Grade 10 (Scale 10), £1,190/£1,325 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market St, Huddersfield, not later than 10 Nov., 1961.

No. 3 (Sheffield) Sub-Area

SHEFFIELD CENTRAL DISTRICT

THIRD ASSISTANT DISTRICT ENGINEER

Applicants should have experience in the work of a District Engineering Department including construction, operation, maintenance and planning.

Salary: N.J.B. Class H, Grade 9 (Scale 8), £1,040/£1,165 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Change Alley, Sheffield, not later than 10 Nov., 1961.

No. 7 (Grimsby) Sub-Area

GAINSBOROUGH DISTRICT

DEMONSTRATOR

Applicants must have had experience in the demonstration of electrical appliances, and be capable of advising consumers on any matter relating to the use of electricity in the home.

They must have had experience in cooking practice and general duties in the showroom. Preference will be given to applicants holding certificates of a recognised Domestic Training College, Housecraft Advisers' Diploma, Certificate of the Electrical Association for Women, or equivalent qualifications.

Salary: N.J.C. Grade 1, £600 x £25—£700 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Rd, Grimsby, not later than 10 Nov., 1961. (C 416)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Dumfries and Galloway Area

DISTRICT COMMERCIAL ASSISTANT

DUMFRIES DISTRICT

APPLICATIONS are invited for the post of District Commercial Assistant based at Dumfries.

Applicants should be over 21, have a good general education and be able to advise consumers on the supply tariffs, the use of domestic and small commercial, agricultural and horticultural equipment. The successful applicant will be required to supervise Service Centres and arrange window displays, exhibitions and demonstrations. A knowledge of the electrical industry will be an advantage.

The post is superannuable and the salary is £780/£880 per annum.

Applications, stating age and experience, should be submitted to the Manager, S.S.E.B., Marchmount, Dumfries, not later than 3 Nov., 1961. (C 403)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

CROYDON "B" POWER STATION

Vacancy No. 267/61.

GENERAL ASSISTANT ENGINEER (RELIEF)

APPLICANTS should have at least O.N.C., and should preferably have experience of Power Station operation.

Salary: N.J.B. Class J, Grade 14, £815/£920 per annum, with a shift allowance at the rate of £90 per annum when applicable.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey, to arrive by 6 Nov. (C 412)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Region

ELECTRICAL ENGINEER'S DEPARTMENT

THIRD ASSISTANT ENGINEER

REQUIRED in the Plant Design and Investigations Section of the Technical Branch based on Leeds.

The Section is concerned with design problems relating to the major electrical plant items in power stations and on the transmission system and the investigation of faults and breakdowns, including the preparation of reports.

Candidates should have had manufacturing, operating or design experience in the generation or transmission field and technical qualifications leading to Corporate Membership of the I.E.E.

The salary for this appointment will be in accordance with the National Joint Board Agreement, Grade 8, Class K (£1,145/£1,410 per annum).

Forms of application may be obtained from the Regional Personnel Officer, Central Electricity Generating Board, North Eastern Region, 1 Whitehall Rd, Leeds, 1 to whom they should be returned to arrive not later than 10 Nov., 1961. (C 425)

Eastern Electricity

Northmet Sub-Area

THIRD ASSISTANT ENGINEER

HORNSEY DISTRICT

(Ref. 1026) 219/61.T.

CANDIDATES should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary: N.J.B. Class G, Grade 9 (£965/£1,090) plus London Allowance).

Apply by letter to C. Bradley, Esq., M.I.E.E., Manager, Eastern Electricity Board, The Broadway, Crouch End, London N.8, by 6 Nov., 1961. (C 413)

ASSISTANT CHIEF ELECTRICAL ENGINEER

Applications are invited for the position of Assistant Chief Electrical Engineer, responsible to the Chief Electrical Engineer for the co-ordination of the operation and maintenance of London Transport's electric power supply and distribution system, supplying a peak railway load of the order of 200 MW.

Applicants should have a thorough and practical knowledge of power generation, distribution and conversion, and experience in dealing with staff. They should also be capable of conducting negotiations with staff representatives concerning conditions of service. As the electric power supply system is in process of modernisation, with an extensive programme for the replacement of plant and equipment, high technical attributes will be required.

The commencing salary will be based on the qualifications and experience of the selected candidate, within the range of £2,700/£3,600 per annum. Applicants should be not more than 50 years of age, and be Corporate Members of the Institution of Electrical Engineers.

Certain free travel facilities; contributory superannuation scheme.

Applications stating age, qualifications, present salary and giving full details of experience should be sent to:—

Chief Establishment Officer (FV/O.47/5)
London Transport Executive,
55 Broadway, S.W.1.

(C 411)

A national INDUSTRIAL ELECTRICAL WHOLESALER, with an expanding organisation, is looking for a number of senior salesmen with a dynamic approach to selling and especially men who are seeking advancement to management.

Excellent prospects are offered to the right men in London and the Midlands.

Apply, giving full details of career to the Sales Director, Box No. 8451, Electrical Times. (C 407)

ELECTRICAL DESIGNER

An intelligent, capable senior Electrical Designer is required preferably with experience of petro-chemical or heavy industrial installations by a London engineering company. Applicants must be able to accept responsibility as this is an expanding department and a policy of "promotion from within" operates. Salary expectation can be as high as £1,500 for the right man. Our present staff are aware of the vacancy. Please send brief details of your experience, etc., to Box No. 8455, Electrical Times.

(C 431)

You'll find room to expand with

'ENGLISH ELECTRIC'

FRACTIONAL HORSE POWER MOTOR DIVISION

SENIOR DESIGN AND DEVELOPMENT ENGINEERS

As a result of the expanding field of application of F.H.P. motors, The English Electric Company are about to make senior appointments to their Design and Development Department.

Qualified engineers experienced in this field, who are interested in developing and applying modern design methods possibly including the use of a digital computer are invited to submit details of their technical education, training and experience, quoting reference number ET 0097B.

These appointments will be of particular interest to men seeking opportunities for greater responsibility.

Please reply to Technical Staff Officer, Dept. G.P.S., English Electric House, Strand, London, W.C.2

(C 382)

'ENGLISH ELECTRIC'

LIAISON ENGINEER

Responsible for Technical Supplies

The rapidly expanding business of specialised electronic tube and valve manufacture calls for a large variety of special components and materials, often in un-economical production quantities. A leading manufacturer is posed with the problem of obtaining these supplies against short-term delivery at the same time to tight specification.

We are seeking a man, probably aged 30-40, with a dynamic personality to take up a new post to liaise between outside suppliers and production development departments. He would ideally have a good background in light engineering industry, but should also have some knowledge of purchasing problems and sources of supply in the electronic industry.

The position will involve the selected candidate in travel at home and abroad for short periods.

We are prepared to pay a man with the right background and personality £1,400/£1,600 per annum.

Please reply, in confidence, to Box No. 8453, Electrical Times.

(C 410)

ASSISTANT INSTRUCTOR

Is required by Stewarts and Lloyds Ltd. for the Electrical Engineering Training Workshop at their Works at Corby, Northamptonshire.

The successful applicant will serve on the staff of the Corby Area Training Officer and he will assist the Instructor in giving basic craft instruction to electrical engineering apprentices.

Applicants should have served an apprenticeship in electrical work and they should have had some years' experience in the trade. They should hold either an Ordinary National Certificate in Electrical Enginering or an appropriate City and Guilds Certificate. A keen interest in youth and, in particular, in the training of apprentices is desirable.

Application forms, which should be returned within a fortnight of the appearance of this advertisement, may be obtained from:

The Assistant Director of Training,
STEWARTS AND LLOYDS LTD.,
Broad St Chambers,
Birmingham 1.
Please quote Reference TRG/CY/4.
(C 393)

CENTRAL ELECTRICITY GENERATING BOARD
Western Division

W/AV/103/61.

General Assistant Engineer (Chemist)

Required at Hayle Generating Station, Cornwall.

Superannuation Scheme. Salary: N.J.B. Class F, Grade 12, Scale 3, £715/£805 p.a.

Applicants should preferably possess the H.N.C. in Chemistry and should have had experience of the basic chemical services for a Steam Power Station relating mainly to fuel sampling and analysis, water treatment and boiler water control, for a medium pressure plant.

Applications on Form AE6/ACT, obtainable from the Regional Personnel Department, 26 Oakfield Rd, Bristol 8, should be completed and returned by 8 Nov., 1961.

W/AV/104/61.

Third Assistant Engineer

Required in the Measurements Section of the Divisional Electrical Department.

Superannuation Scheme. Salary: N.J.B. Class K, Grade 8, Scale 11, £1,145/£1,410 p.a.

Candidates must have experience in testing precision power metering equipment including V.T's and C.T's, various types of summation equipment and instruments, in the laboratory and on site. A knowledge of electronic instruments would be an advantage.

The successful applicant will be required to drive a car.

Applicants should preferably possess qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

Applications, on Form AE6/ACT, obtainable from the Regional Personnel Department, 26 Oakfield Rd, Bristol 8, should be completed and returned by 6 Nov., 1961.

W/AV/105/61.

Assistant Shift Charge Engineer

Required at Plymouth "B" Power Station.

Superannuation Scheme. Salary: N.J.B. Class J, Grade 8, Scale 10, £1,190/£1,325 p.a., plus 10% shift allowance.

Applicants should possess good technical qualifications and have had training and experience in the Control and Operation of Modern Steam generating plant and main switchgear.

Applications, on Form AE6/ACT, obtainable from the Regional Personnel Department, 26 Oakfield Rd, Bristol 8, should be completed and returned by 7 Nov., 1961. (C 430)

BRITISH RAILWAYS
(Western Region)

TECHNICAL ASSISTANT
Locomotive Works, Swindon

Assisting on section dealing with the design and layout of electrical distribution systems and services in Swindon Locomotive Works, and the preparation of specifications for electrical equipment. Will also be required to assist with the development of facilities for the repair, testing and defect investigations of diesel engined locomotives. Minimum technical qualifications O.N.C. (Electrical).

Commencing salary £925 p.a. rising to £1,000 after two years.

Superannuation scheme. Sick pay. Travelling facilities.

Applications to:

Chief Mechanical and Electrical Engineer,
British Railways,
Western Region,
Swindon, Wilts.

(C 385)

The Institution of Electrical Engineers

EDITORIAL VACANCY

An Editorial Assistant is required for the PROCEEDINGS of The Institution. Ability to edit high-class technical copy essential and some engineering experience. Candidates should be approx. 25-30 years and preferable have an Engineering or Science degree, or equivalent qualification. Commencing salary of the order of £1,000 p.a., plus or minus an amount to be determined according to qualifications and experience. Five-day week; pension scheme; staff restaurant.

Apply:
The Secretary,
The Institution of Electrical Engineers,
Savoy Place, London W.C.2. (C 423)

IMPERIAL CHEMICAL INDUSTRIES LIMITED

PLASTICS DIVISION

has vacancies at its headquarters at Welwyn Garden City for the following appointments:

(a) Designers (Electrical) for power and lighting installations in industrial plant. (Experience with British Standards, Flameproof and intrinsically safe practice would be an advantage.)

(b) Designers and Draughtsmen (Instruments) for application of instrumentation, including automatic control of industrial plant.

(c) Experimental Officers for (i) work on instrument evaluation and automatic control systems (knowledge of machine tools and workshop practice would be an advantage); (ii) work on development of electronic equipment for use in the measurement and control field. (A knowledge of transistorised circuits and pulse techniques would be an advantage.)

Candidates should have an appropriate Higher National Certificate or Ordinary National Certificate and experience in the field offered.

Excellent conditions of service include a 37½-hour, five-day week, a Pension Fund and a Profit Sharing scheme. For married men assistance is given towards removal expenses and a lodging allowance.

Apply briefly, quoting Reference No. 5147, to the Personnel Officer, Imperial Chemical Industries, Plastics Division, Bessemer Rd, Welwyn Garden City, Herts. (C 387)

CENTRAL ELECTRICITY BOARD OF THE FEDERATION OF MALAYA

CAMERON HIGHLANDS HYDRO ELECTRIC SCHEME

JOR POWER STATION

APPOINTMENT OF STATION SUPERINTENDENT

APPLICATIONS are invited for the appointment of Station Superintendent, Jor Hydro Electric Station, Cameron Highlands, Malaya.

Applicants should normally be between the ages of 38 and 50, but applications will be considered from persons over the age of 50.

They should preferably be Corporate Members of the United Kingdom Institution of Mechanical Engineers, or Institution of Electrical Engineers, or possess a recognised Engineering Degree/Diploma of a Commonwealth University or Educational Establishment.

Applicants should have had at least 15 years' experience in major power stations, ten of which have been spent in hydro electric installations, with at least five years in a position of superior responsibility.

Jor Power Station is an underground installation which will be commissioned with 2 x 25 MW Pelton wheel generating sets and when completed will have a total of four such sets. The outgoing transmission circuits will be 132 kV.

The duties of the post carry responsibility for operation and maintenance of all mechanical and electrical plant, upkeep of all building and civil engineering installations, staff and financial matters in Jor Power Station and two smaller ones in the same scheme.

The appointment is on contract for approximately three years.

This is a Superscale post and the salary will be as follows, depending upon marital commitments:

Bachelor: £3,200 per annum.

Married man: £3,550 per annum.

Married man with one or more children: £3,750 per annum.

Payment of salary would normally be made in Malaya in Malayan dollars at a fixed rate of exchange of 2s 4d to $1 Malayan, but at the option of the officer an amount of up to one-third of the total salary may be paid in sterling to the officer's account in his country of domicile.

The salaries offered are all inclusive, but the terms of service include the provision of accommodation at a nominal rent, free medical attention, a motor car allowance where the work necessitates the use of a vehicle and terminal leave on full pay at the end of the contract.

First class passages to Malaya and return to the country of domicile will be provided for the officer, his wife and children up to the age of 16 years, subject to a maximum of three children.

If a married man leaves his family in his country of domicile free passages for a family reunion in Malaya during the contract will be provided on request, or alternatively, the officer may elect to go on annual leave to his country of domicile.

Apply to CROWN AGENTS, 4 Millbank, London S.W.1, for application form and further particulars, stating age, name, brief details of qualifications and experience and quoting reference M2A/51454/EE. (C 402)

OVERHEAD TRANSMISSION LINE ENGINEERS

Large contracting organisation has vacancies for Agents, Sub Agents and Engineers, on 275 kV and 132 kV steel tower and wood pole line contracts in Scotland. State age and give full particulars of experience to Box No. 577, Keith & Co., 11 Castle St, Edinburgh. (C 428)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

APPLICATIONS are invited for the position of

ASSISTANT SHIFT CHARGE ENGINEER

at Drakelow "A" Power Station, nr. Burton-on-Trent, Staffs. Salary will be in accordance with N.J.B. service conditions, Grade J.8, £1,190/£1,325 per annum, plus 10% for shift duties.

Applicants should possess a Higher National Certificate or equivalent qualifications and have received sound technical and practical experience in a modern power station. Experience of pulverised fuel firing would be an advantage.

Apply, quoting Vacancy No. 236/61 MR on Form AE6, available from the Station Superintendent, Drakelow Power Station, nr. Burton-on-Trent, Staffs. Closing date for receipt of applications: 6 Nov., 1961. (C 398)

Eastern Electricity

Northmet Sub-Area

SENIOR ASSISTANT

ESTATES AND WAYLEAVES SECTION

SECRETARIAL OFFICER'S DEPARTMENT

220/61.R. (Ref.: 1090)

THE duties will include negotiations for the acquisition of substation sites up to 33 kV, obtaining wayleaves and dealing with agricultural and other damage claims for compensation.

Salary: N.J.C. Grade 4 (£934 10s/£1,060 per annum), inclusive of London Allowance.

Apply by letter, giving age, education, qualifications, experience and details of present and previous appointments to The Manager, Eastern Electricity Board, Northmet Sub-Area, Northmet Hse, Southgate, London N.14, by 6 Nov., 1961. (C 426)

RESIDENT ENGINEER

FOR CYPRUS

Applications are invited for the appointment on agreement of a RESIDENT ENGINEER to supervise an extension to Dekhelia Power Station in Cyprus, comprising the addition of one 14,000 kW Steam Turbo-Alternator Set, one 90,000 lb/hour Oil Fired Boiler and associated auxiliary equipment.

Applicants must be Corporate members of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers, and should have had previous experience of power station construction including civil, mechanical and electrical work.

The salary of the successful applicant will depend on qualifications and experience subject to a maximum of £2,500 per annum. In addition, he will be provided with free accommodation and hard furnishing. He will also be eligible on commencement and termination of his engagement for free passages for himself and his wife and children to a maximum of three full passages.

The period of the engagement will be 12 to 18 months. Leave on full pay will be granted on satisfactory termination of engagement at the proportionate rate of 2½ days per month of service.

The successful applicant will be required to take up his duties in the early part of 1962 and will be in the employment of:—

PREECE, CARDEW & RIDER,

Consulting Engineers,
8, 10 & 12 QUEEN ANNE'S GATE,
WESTMINSTER, LONDON, S.W.1,

to whom applications, giving full details of age, qualifications and experience, should be submitted within 14 days of the publication of this advertisement. (C 406)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Stirling Area

THIRD ASSISTANT DISTRICT ENGINEER

(Ref.: 57/61)

A VACANCY is available for a Third Assistant District Engineer in the Stirling District of the Area based on the town of Stirling.

Applicants should preferably have experience of electricity supply work and possess, as a minimum technical qualification, a Higher National Certificate in Electrical Engineering, or the equivalent.

The salary for the post, which is superannuable, will be within Class F, Grade 9 (Scale 6), of the N.J.B. Agreement (£890/£1,015 per annum).

Applications, on the standard form obtainable from the Area Manager, are to be sent to him at Woodlands, St. Ninians Rd, Stirling, not later than two weeks following the publication of this advertisement. (C 429)

THE NORTH WESTERN ELECTRICITY BOARD

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER

(TECHNICAL SALES AND SERVICE)

SOUTH-WEST DISTRICT

ALTRINCHAM

APPLICANTS should be capable of handling enquiries on Industrial and Commercial Tariff matters and giving electro-technical advice to Industrial and Commercial consumers on the most economical and efficient utilisation of electricity. Preference will be given to applicants who hold the H.N.C. in Electrical Engineering.

Salary Scale: £1,350/£1,500 p.a., Grade K.7. N.J.B. conditions.

Applications on forms to be obtained from the Manager (Staff Vacancy) No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester 2, P.O. Box 493, and returned to him by 6 Nov., 1961. (C 405)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SENIOR SERVICE CENTRE ASSISTANT

REQUIRED at the Board's new Service Centre located at Knutsford in the Northwich District of the Board's No. 2 Sub-Area. Salary within range £700/£775 per annum (N.J.C. Grade 2).

The successful applicant will take charge of the new Service Centre, but may be required to assist in other Service Centres in the Northwich District as and when necessary.

Applicants should have received a sound training on the Commercial side of an electricity undertaking or in the electrical retail trade. A wide knowledge of modern electrical appliances is essential, and possession of the E.D.A. Sales Certificate or similar qualification would be an advantage.

Duties will include the supervision and control of Service Centre staff, display and window dressing, receipt of cash and hire purchase and credit sales.

Appointment subject to medical examination. Pension Scheme.

Application forms obtainable from the Manager, No. 2 Sub-Area, Sandiway Hse, Northwich, Cheshire. Closing date: 10 Nov., 1961. (C 388)

ASSISTANT ELECTRICAL ENGINEER in consulting engineer's London office. Design drawing, supervision of electrical installations in schools, hospitals, factories, etc. Five-day week, superannuation, salary range £800/£1,000 p.a. Apply in writing: R. W. Gregory and Ptnrs, 42 Kingsway, W.C.2. (C 345)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

SHIFT CHARGE ENGINEER

REQUIRED at Coventry Power Station, Coventry. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade G.7, £1,115/£1,245 per annum, plus 10% shift allowance.

A sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear are required. Appropriate qualifications desirable.

Apply, quoting Vacancy No. 233/61 MR on form AE6, available from the Station Superintendent, Coventry Power Station, Aldermans Green, Coventry, by 6 Nov., 1961. (C 400)

THE NORTH EASTERN ELECTRICITY BOARD

CHIEF ENGINEER'S DEPARTMENT

APPLICATIONS are invited from suitably qualified engineers for the appointment of

FOURTH ASSISTANT ENGINEER

Plant Repairs Sub-Section, with location at Carville, Wallsend. Applicants should preferably have had some experience in the repair and maintenance of electrical plant on the Board's system with emphasis on transformers and switchgear and will be required to undertake standby duty.

Salary: Class K, Grade 10, £980/£1,245 per annum. Conditions of service in accordance with N.J.B. Agreement.

Applications in writing, stating age, qualifications and experience, to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne 1, within ten days of the appearance of this advertisement. (C 414)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following positions:

GENERAL ASSISTANT DISTRICT ENGINEERS (DRAWING OFFICE) (TWO)

BRISTOL

Salary within Class K, Grade 13, Salary Scale 6, £890/£1,015 per annum of the N.J.B. Agreement.

Applicants should have experience in a Distribution Drawing Office and be able to undertake, under supervision, duties which include estimating distribution schemes and preparation of associated drawings, and system networks and diagrams.

Candidates must possess the Ordinary National Certificate in Electrical Engineering.

Applications to be made on standard form AE6/ACT, OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, Electricity Hse, Colston Ave, Bristol. Closing date for receipt of completed applications is 11 Nov., 1961 (C 418)

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East Sussex and South West Kent Sub-Area

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WAGES 5s 6½d per hour for 42-hour five-day week under N.J.I.C. Agreement. The successful applicant will be based on the workshop at Eastbourne, but the duties will chiefly comprise erection and maintenance of switchgear and transformers in major substations in all parts of the Sub-Area.

Applications, quoting ET and naming two referees, to East Sussex and South West Kent Manager, Seeboard, Westlords, Willingdon Rd, Eastbourne, by 6 Nov., 1961.

GEORGE WRAY,
Secretary.
(C 415)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

A REPRESENTATIIVE is required by a Company manufacturing small electromechanisms, to cover London and the South Eastern Area. Applications are invited from experienced men, with an electrical engineering background, within the age group 25/35 years. Write Box 9598, Frost-Smith Advg, 64 Finsbury Pavement, London E.C.2. (C 409)

ELECTRICAL ENGINEER SURVEYOR for inspection of plant and installations. Must have H.N.C. in Electrical Engineering and experience in repair of motors. Not over 35 years. Area S. and S.E. Birmingham. Starting salary £825 rising to £1,225 (E.S.A. Scale). Pension. Widows' Pension and other benefits. Write Manager, Engineering Dept., General Accident Assurance Corp. Ltd., 99 Aldwych, London W.C.2. (C 392)

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Applicants should have served an indentured apprenticeship in the Electrical Contracting Industry and should have a good knowledge of all types of installations and I.E.E. Regulations. Experience in a similar position and knowledge of underfloor heating systems an advantage.

Applications on forms obtainable from the Borough Engineer and Surveyor, Civic Centre, Southampton, returnable by Monday, 6 Nov., 1961. (C 396)

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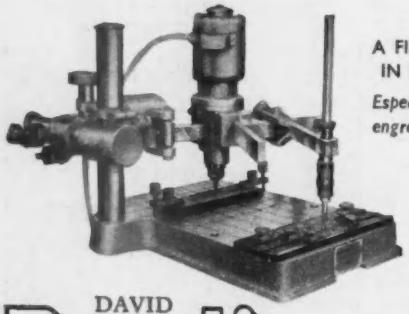

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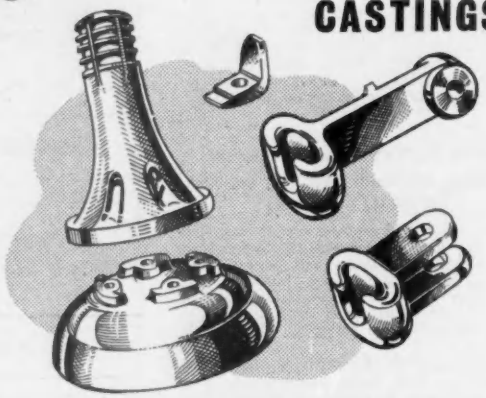

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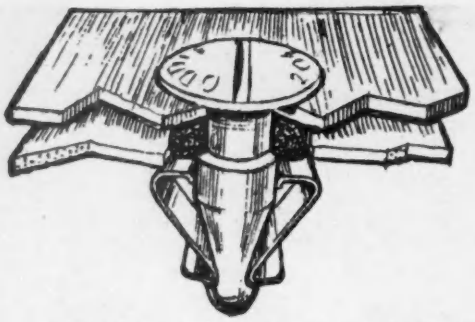

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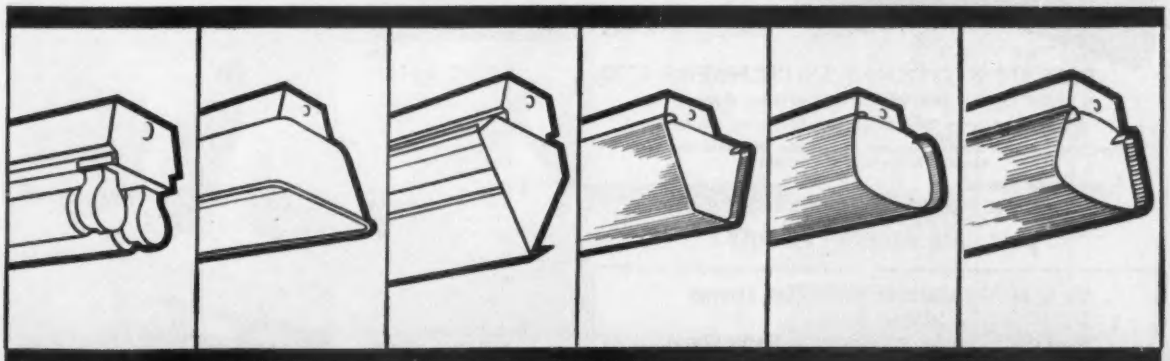

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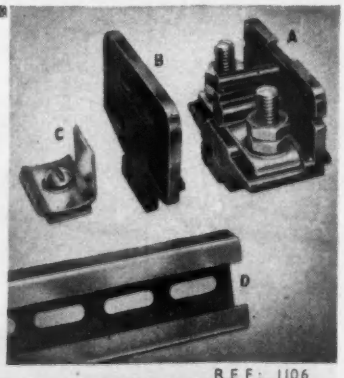

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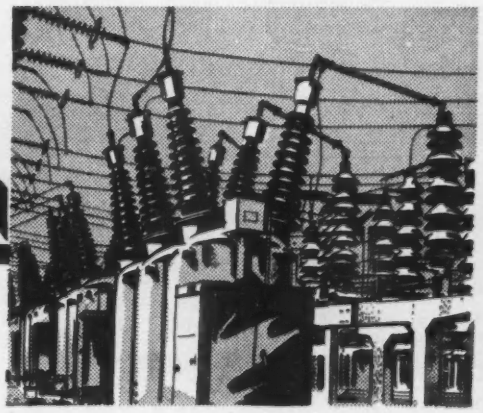

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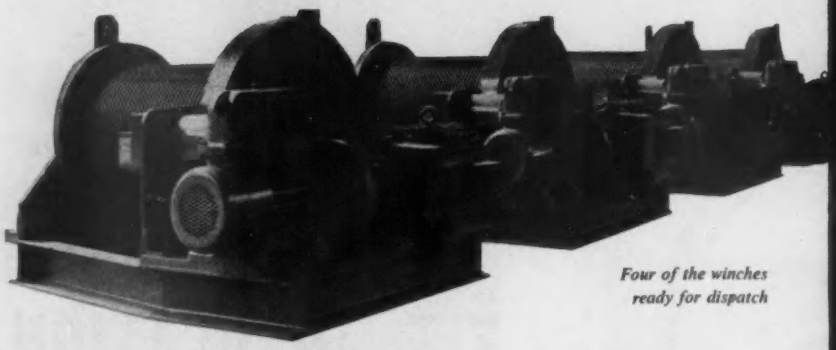

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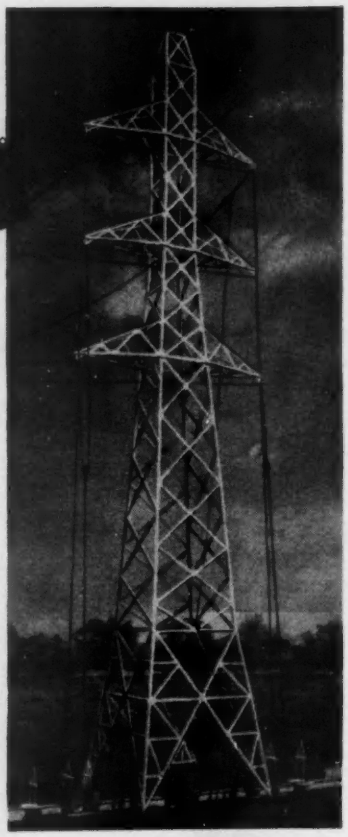

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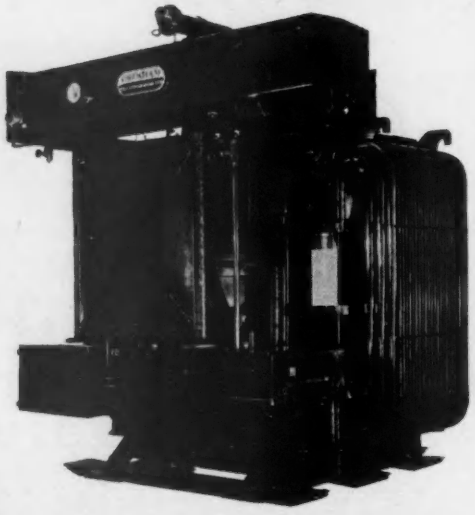

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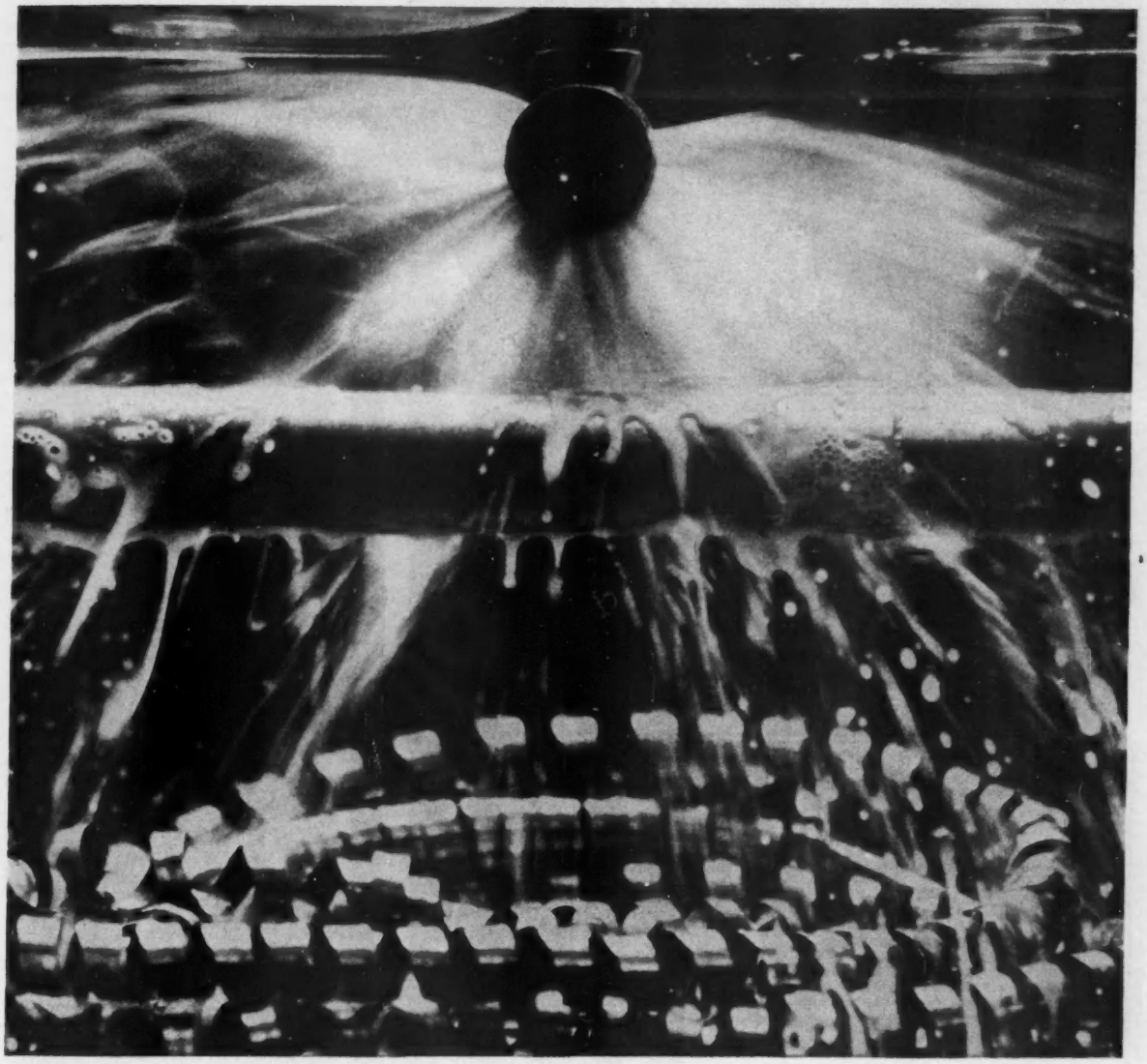

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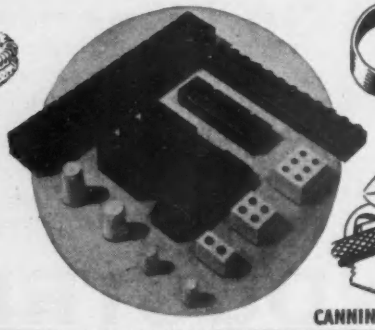

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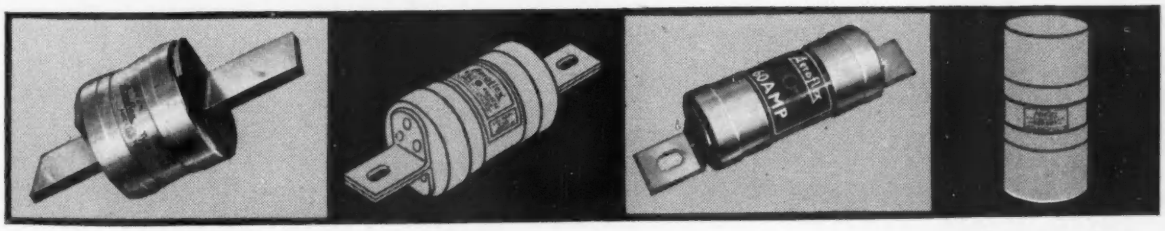

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